Engineering and Maintenance

MISSOURI PACIFIC LINES
ROUTE OF THE Eagles
The Streamlined, Diesel-powered
Eagle Fleet Runs Between
St. Louis and the West-Southwest
Railroads East, West, North and South have
found effective and dependable anchorage in
THE IMPROVED FAIR RAIL ANCHOR

IMPROVED

RELIANCE FROG and CROSSING HY-CROME SPRING WASHERS

Improved Reliance Frog and Crossing Hy-Crome Spring Washers have been developed specifically for frog and crossing application, providing adequate protection from looseness of bolted parts resulting from wear. To achieve this, range of reaction together with reactive pressures have been developed through laboratory experiments and actual service tests. The design provides the nut with the necessary bearing surface, and ground deflected ends make reapplication possible without damaging the contacting parts. Important tension is maintained by providing the necessary range of recovery between maintenance periods. When these washers are correctly installed, an equal bolt tension is obtainable.

For many years maintaining tight bolts in frogs and crossings has presented a difficult problem. While spring washers in general have been of considerable help in meeting these conditons, it has been emphasized by experienced Track Maintenance Engineers how valuable it would be to have available a specially designed spring washer which would more completely meet their requirements. Improved Reliance Frog and Crossing Hy-Crome Spring Washers were especially designed to meet these requirements. Their automatic mechanical action and helical form will only flatten at a sufficient predetermined applied load. Wide range of reaction and adequate pressure provides tension, pending maintenance tightenings. This tension is constantly functioning, helping to eliminate failures occurring from service wear of bolted parts.

Available in sizes for 1⅛", 1¼", 1⅜" and 1½" thread diameter bolts, Improved Reliance Frog and Crossing Hy-Crome Spring Washers have been thoroughly tested in service. Our engineers will appreciate an opportunity to supply additional data and discuss an installation with you at your convenience.

EATON

EATON MANUFACTURING COMPANY

EATON **RELIANCE DIVISION, MASSILLON, OHIO**

Sales Offices: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Mont

BETHLEHEM *Winter Kings* ....an investment in safety

Now — early fall — is the time to place orders for your Winter King Switch Heaters. Gives you a chance to install them before snow and ice really get a foothold.

These inexpensive little heaters are one of the best investments you can possibly make, with cold weather coming on. Light, compact, they slip easily between ties so that the flame is beneath rail and switch point. Fighting snow as it falls, Winter Kings protect against freeze-ups far more effectively than hand methods. Even gusty winds don't snuff out the flame, which usually burns from 9 to 15 hours on a single filling of kerosene.

The big feature of the Winter King, of course, is the constant, dependable protection it offers. But don't overlook its economy — both in first cost and fuel. Consider, too, the scant attention it needs: one man can service a large group daily and still have ample time left over for other duties.

If snow and ice are a threat to switches in your area, we suggest you install Winter Kings as early as possible. Call the nearest Bethlehem man for full details — soon!

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

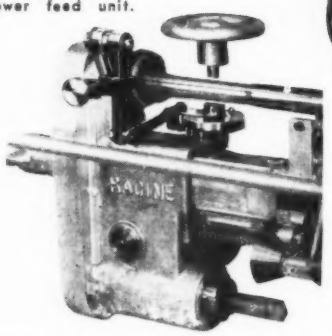
BETHLEHEM STEEL

Published monthly by Simmons-Boardman Publishing Corporation, 79 W. Monroe St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00 for one year; $3.00 for two years. Single copies 50 cents. Entered as second-class matter January 20, 1933, at the post office at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., post office. Address communications to 79 W. Monroe St., Chicago 3, Ill.

Light-Powerful
RACINE
Portable Rail Drill

with
AUTOMATIC POWER FEED

Detail of automatic power feed unit.



This powerful, compact, precision built horizontal type drill is designed to simplify and speed up rail drilling in track and rail maintenance repair work. Because of its light weight, roller mounted design, this new rail drill can be handled by just one man. Speeds up drilling operations and reduces man-hour costs.

CONSTRUCTION AND OPERATING FEATURES

★ Powered by a 2½ H.P. 4 cycle gasoline engine connected to drill chuck through a 30 to 1 reduction gear. Adequate power for drilling holes through any rail web in less than two minutes. Engine has built-in high tension fly wheel magneto that insures quick easy starting.

★ Quick-acting powerful clamps hold machine in position on rail. Clamping automatically aligns machine. Drill bit is always properly positioned and securely in place. Position of drill is adjustable for all rail sizes. Lubrication is provided by a grease reservoir that encloses gears and drill spindle.

★ Drill bit is protected by automatic release feature of the feed unit. Quick-acting drill holder provides ease in changing drills.

★ Easy to handle. Carrier guard protects operating mechanism and provides a means for lifting machine onto track cars or quick removal from rail in cases of emergency. Total weight less than 165 lbs.

★ A single adjustable carrier places the traction wheels of drill in contact with rail. Can be easily rolled from one joint to the next without lifting from rail.

★ Automatic spring pressure power feed can be set for proper feeding rate for various size drills and web thicknesses. Insures uniform pressure and longer drill life. Hand feed is also available when needed.

Write for your copy of our new 711 Railway Maintenance Machines Catalog. Address Racine Tool and Machine Co., 1738 State St., Racine, Wis.

STANDARD FOR QUALITY AND PRECISION · RACINE · RACINE TOOL and MACHINE CO.

RACINE

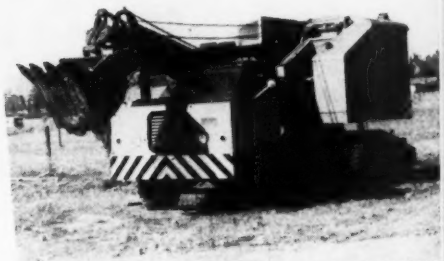
STANDARD FOR QUALITY AND PRECISION

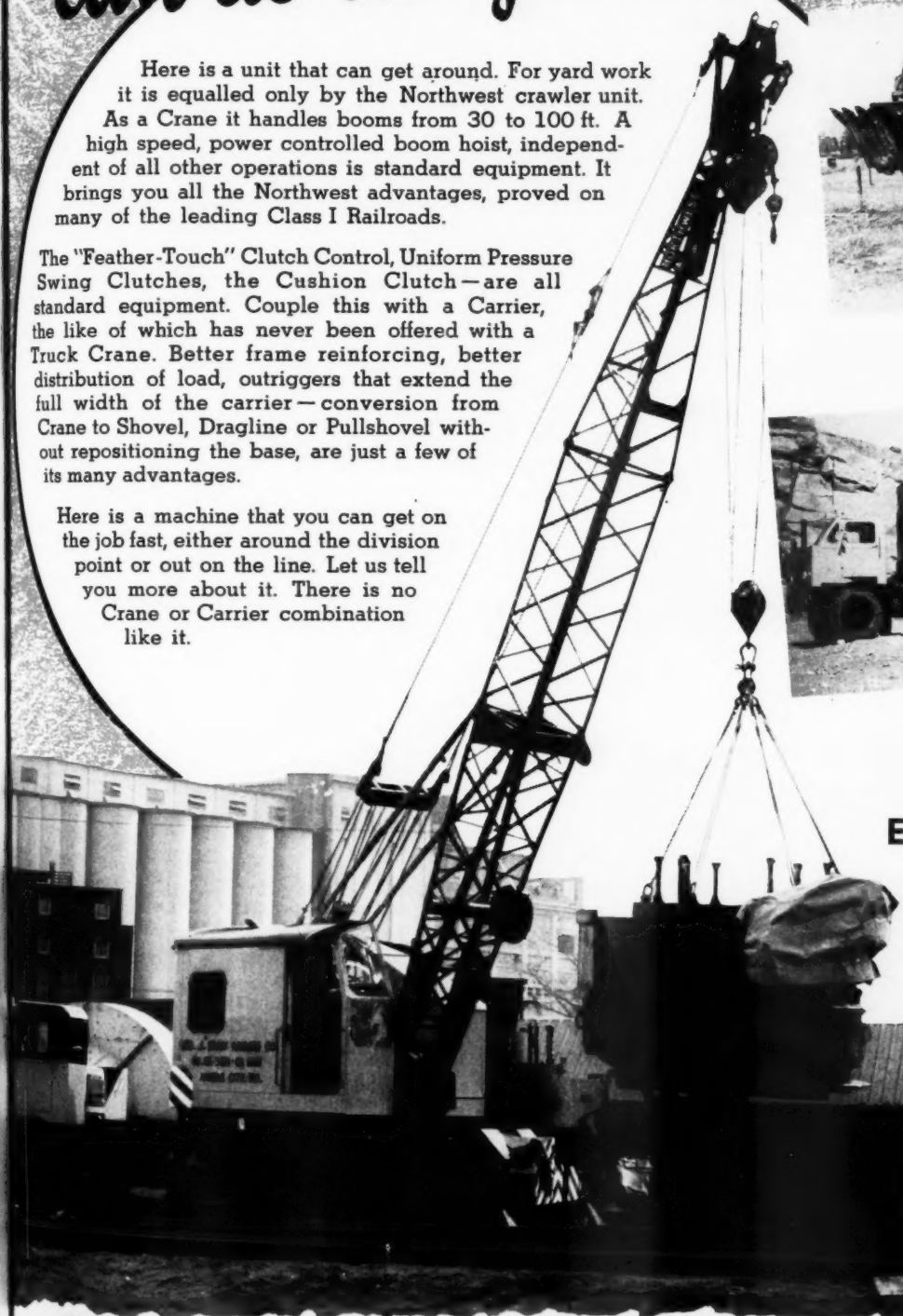
Think what this machine can do on your Division!

Here is a unit that can get around. For yard work it is equalled only by the Northwest crawler unit. As a Crane it handles booms from 30 to 100 ft. A high speed, power controlled boom hoist, independent of all other operations is standard equipment. It brings you all the Northwest advantages, proved on many of the leading Class I Railroads.

The "Feather-Touch" Clutch Control, Uniform Pressure Swing Clutches, the Cushion Clutch—are all standard equipment. Couple this with a Carrier, the like of which has never been offered with a Truck Crane. Better frame reinforcing, better distribution of load, outriggers that extend the full width of the carrier—conversion from Crane to Shovel, Dragline or Pullshovel without repositioning the base, are just a few of its many advantages.

Here is a machine that you can get on the job fast, either around the division point or out on the line. Let us tell you more about it. There is no Crane or Carrier combination like it.





NORTHWEST ENGINEERING CO.
1513 Field Building
135 South LaSalle St.
Chicago 3, Illinois

NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

IT PAYS FOR ITSELF!

The new
MAGOR
Automatic Air Dump Car

● When you add up the savings effected by Magor Automatic Air Dump Cars for maintenance of way work, you'll find that Magor cars pay for themselves in a few short years.

Here's how it figures—

Train crew, foreman, labor gang and work train equipment run the cost of the average work train up to about $200 a day. But, in any eight hour day, you're lucky if you get six or seven hours on the job. And out of those short hours time is spent waiting for the crane to unload gondolas. But, it takes one man less than a minute to dump a fully loaded Magor Automatic Air Dump Car—an important factor in busy territory.

Figure you save one hour a day—twice a week in this service. That's over a hundred hours a year. Figured on the basis of $200 a day, that's a savings of $2600.

Naturally, you're going to use your Magor Air Dump Cars for more than we've figured. Especially after you learn how handy they are for numerous jobs that you've been doing in the old expensive way—ditching, cut widening and shoulder fill; rip rap and washout service; locomotive ash pit and terminal waste disposal; tie and rail hauling; snow removal; and construction work involving sand, gravel and other materials.

Maintenance savings add up too. Magor Cars are rugged and dependable. They'll operate efficiently on the toughest jobs.

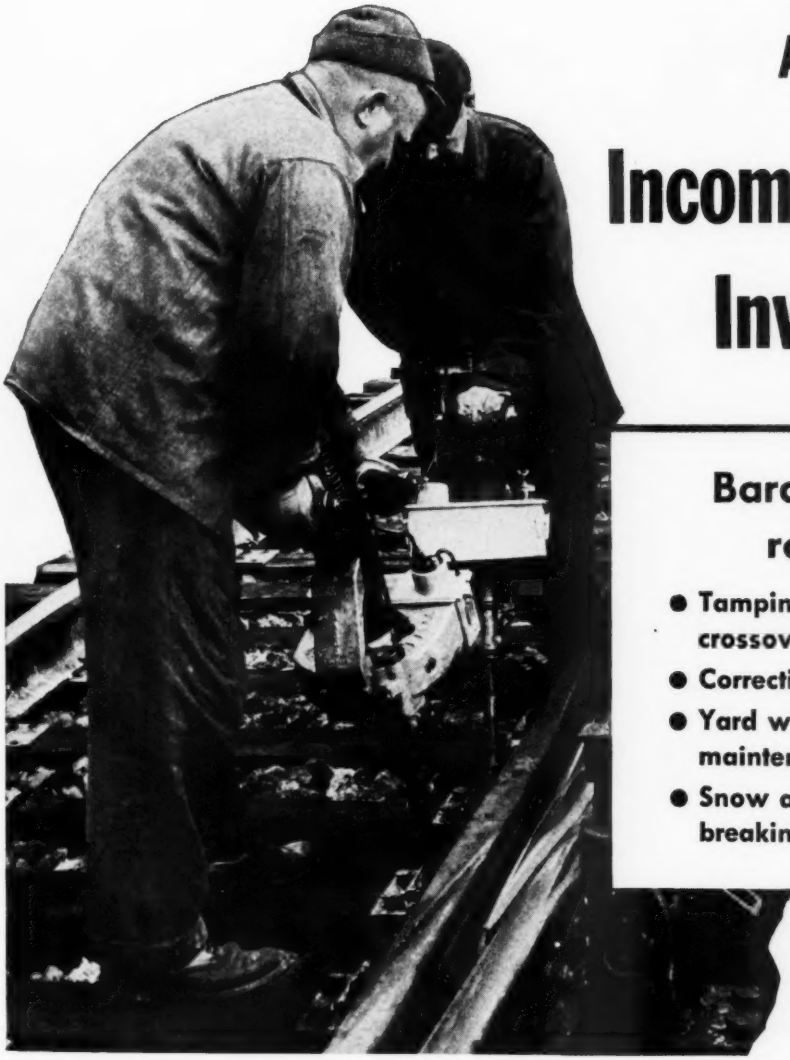
Look into this equipment that pays for itself.

Ask for our free bulletin D-100 for further information showing how you can save your Company important maintenance dollars.

MAGOR

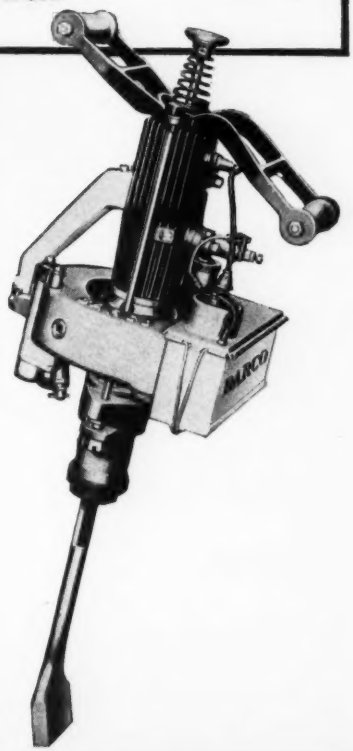
CAR CORPORATION, 50 CHURCH ST., NEW YORK 7, N. Y.
World's Largest Producer of Air Dump Cars

TWO BARCO TYTAMPERS PER SECTION ARE AN Income-Producing Investment



Barco does a wide range of jobs

- Tamping interlocking switches, crossovers
- Correcting low spots
- Yard work and miscellaneous maintenance
- Snow and ice removal and light breaking work



Armed with 2 Barco Tytampers, a section gang can eliminate frequent resurfacing of track and provide much easier riding for passengers, reduce wear and tear on equipment. Over 100 American railroads prefer Barco because they want *income-producing* equipment that gives maximum maintenance at lowest cost. Light in weight and correctly balanced, Barco is self-contained, provides easy portability on busy right-of-ways, is the only tamper that tamps cemented ballast. For detailed information, write Barco Manufacturing Company, 1805 Winnemac Avenue, Chicago 40, Illinois. In Canada: The Holden Company, Ltd., Montreal, Canada.

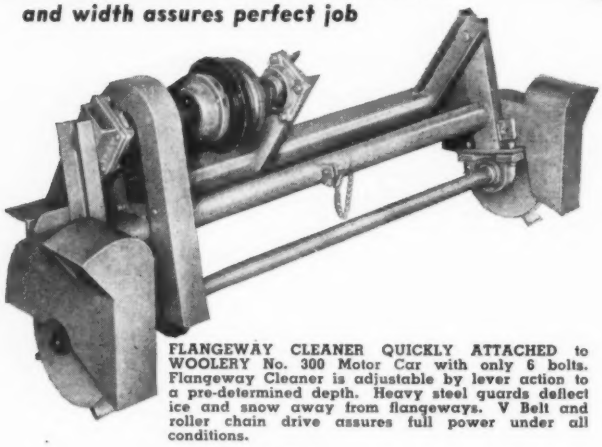
BARCO

UNIT TYTAMPERS

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY

CLEAN FLANGEWAYS of snow and ice

- **EASIER** . . . *power does the work*
- **FASTER** . . *takes minutes, no hand work*
- **CLEANER** . . *Predetermined depth and width assures perfect job*



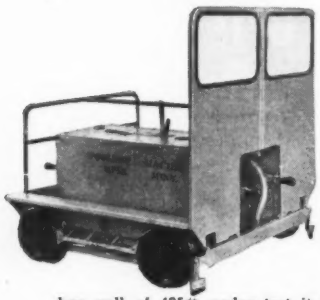
FLANGEWAY CLEANER QUICKLY ATTACHED to WOOLERY No. 300 Motor Car with only 6 bolts. Flangeway Cleaner is adjustable by lever action to a pre-determined depth. Heavy steel guards deflect ice and snow away from flangeways. V Belt and roller chain drive assures full power under all conditions.

WITH THE NEW

WOOLERY

Dual Purpose

300 MOTOR CAR and FLANGEWAY CLEANER



THE WOOLERY No. 300 MOTOR CAR with its axle arrangement reduces maintenance cost to a minimum; with a draw bar pull of 405# under test it has pulled up to 20,000# on level track. This is equivalent to twice the load any car of similar weight will pull. The selective differential can be released in advance for taking car on or off track.

Provides Greater Operating Safety by eliminating snow and ice from flangeway at crossings and alleyways. One operator with the WOOLERY No. 300 Self-propelled Flangeway Cleaner will clear miles of track making it safe for heavy rail traffic.

The Woolery No. 300 Motor Car has a 4-wheel drive which doubles the traction and reduces weaving action of the car regardless of the direction of travel. With the 4-wheel drive there are no idling front wheels to consume power and decrease operating efficiency. All the weight of the car, men and tools, is on the driving wheels, front and rear lower case, contributing to increased traction and utilizing the full power of the engine wherever needed. Traction being provided on all 4 wheels, they all wear evenly.

Write for Bulletin No. 178 today. Order your Woolery No. 300 motor car with the Flangeway Cleaner attachment now. Be prepared for the stormy weather ahead.

WOOLERY MACHINE COMPANY

MINNEAPOLIS MINNESOTA

Pioneer Manufacturers of **RAILWAY MAINTENANCE EQUIPMENT**

RAILWAY WEED BURNERS • MOTOR CARS • FLANGEWAY CLEANERS • TIE CUTTERS • TIE PLATE SPACERS • RAIL JOINT OILERS • CREOSOTE SPRAYERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENN.

COMBINES LIGHT WEIGHT WITH DURABILITY AND SAFETY

33⅓% LIGHTER IN WEIGHT . . . EASY TO SPOT . . . EASY TO CARRY

The New

DUFF-NORTON *Aluminum* TRACK JACK

For complete data on the new
117-A ALUMINUM TRACK JACK
Write for Bulletin AD-14

STRENGTH, SAFETY, DURABILITY
DUFF-NORTON JACKS

THE DUFF-NORTON MANUFACTURING CO.

Main Plant and General Offices: PITTSBURGH 30, PA. Canadian Plant: TORONTO 6, ONT.

"The House That Jacks Built"

WITH OLIVER "Cletrac"

Cutting a grade or ditch along the right-of-way is a "clean-cut" job with an Oliver "Cletrac" crawler tractor. The positive control of the dozer blade assured by Oliver "Cletrac's" exclusive steering principle reduces lost time . . . eliminates the need for time-wasting centering of the tractor and dozer. With an Oliver "Cletrac," you travel a straight line . . . the off-center loads so common to dozing operations do not pull the tractor off-side.

The exclusive Oliver "Cletrac" steering principle lets you balance the pull of one track against the pull of the other. One track can be speeded up . . . the other slowed to compensate for the side drag of an off-center load. This feature, plus the easy-operating Heil dozer with its positive-acting front-mounted hydraulic pump, gives you fast, accurate control for a "cleaner cut."

Add to these outstanding features, the rugged construction, exceptional accessibility, and economical maintenance of Oliver "Cletrac" and you'll see why it's the right tractor for right-of-way work. For all the facts, see your Oliver "Cletrac" dealer or write us direct. The OLIVER Corporation, Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio.

Cletrac

a product of

The OLIVER Corporation

A complete line of Crawler and Industrial Wheel Tractors

"THE SIGN OF EXTRA SERVICE"

OLIVER
Cletrac
SALES
SERVICE

PROTECT YOUR ROLLING STOCK

Inside and Out WITH FLINTKOTE RAILROAD PRODUCTS

Get the Made-to-Order Dependability that these specialized products bring to every job they do for you.

IF YOU WANT THE *INSIDE* STORY . . . get the facts on Flintkote Insulation Coatings.

Freight cars, like homes or warehouses, need thermal insulation and sure protection against condensation. Moisture on bare structural metal invites corrosion . . . condensation drip on products and equipment causes heavy losses.

Load a cold car with warm products . . . like flour, sugar, corn starch . . . haul East and West, North and South, mountains to the sea for weather extremes . . . unless you have proper protection, condensation brings trouble.

Flintkote Insulation Coatings will serve you well and meet every shop requirement on application. Cutback types for quick drying protection and easy sprayability . . . non-inflammable emulsion types in both summer and winter grades eliminate application hazards and give anti-sweat performance. All are "tops" in protection against corrosion.

FOR *OUTSIDE* JOBS . . . on frames, under floors and roofs, on slope and end sheets . . . protect your rolling stock with Flintkote Car Cements. These specialized products are highly resistant to water, flying cinders and gravel, resist cracking under temperature changes and they give long-life protection against corrosion . . . Flintkote standard grade or special types formulated to your own specifications.

FLINTKOTE LINE OF RAILROAD PRODUCTS

We'll be glad to send you complete specifications and application data on Asphalt Emulsion Protective Coatings . . . Car Cements . . . Insulation and Anti-condensation Coatings . . . Cold-laid Asphalt Mastic Flooring . . . Building Materials . . . Materials for control of water and dampness problems.

For information, call or write:

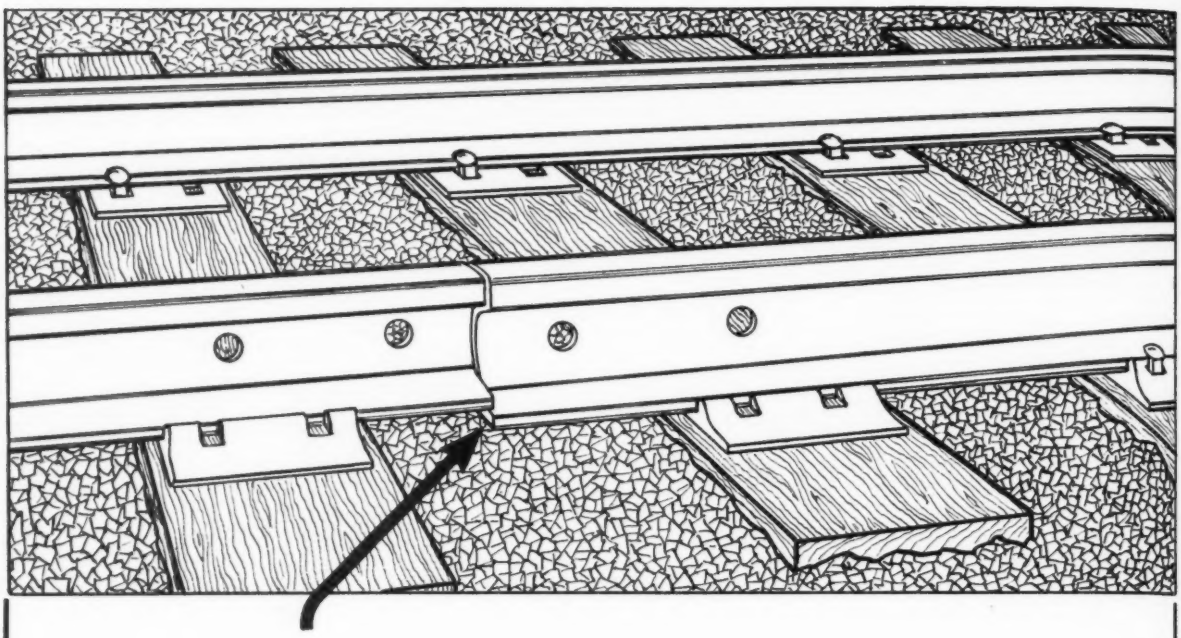
THE FLINTKOTE COMPANY,

Industrial Products Division, 30 Rockefeller Plaza, N. Y. 20, N. Y.

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT
LOS ANGELES • NEW ORLEANS • WASHINGTON
TORONTO • MONTREAL

FLINTKOTE *Products for Industry*

FLINTKOTE INDUSTRIAL PRODUCTS

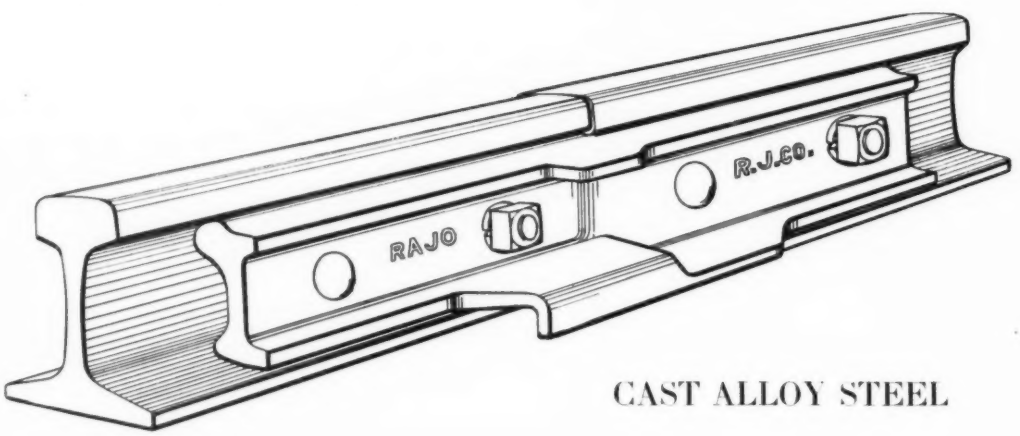


— A Critical Part of Track —

FOR THE BEST FIT, RAIL ALIGNMENT AND SUPPORT

— Use —

RAJO COMPROMISE JOINT



CAST ALLOY STEEL

THE RAIL JOINT COMPANY, 50 CHURCH ST., NEW YORK 7, N. Y.

The *Proof* of the PRODUCT is in its *Performance*

The Very First RIC-WIL Prefabricated Insulated Pipe Units Ever Installed Are Still Giving Trouble-Free Service After 14 Years of Constant Use

1935 Original condition of asphalt-coated conduit.

1941 Asphalt-coated conduit still in perfect condition.

1949: All lines functioning perfectly, trouble-free

- **MINNEAPOLIS "No trouble . . . in constant use"**
- **OMAHA "In good condition and is still serving in its original capacity"**
- **DES MOINES "No trouble . . . in first class shape"**

In 1935 the first Ric-wiL Insulated Pipe Units using asphalt-coated Hel-cor conduit as the outer protective housing were installed for a large products pipe line company, at Minneapolis, Omaha and Des Moines. Each of these steam lines consisted of 3" pipe insulated and enclosed in 8" conduit of standard 21' length Ric-wiL Units, with return lines laid outside the conduit.

In 1941 a check-up on these Ric-wiL Units under actual service conditions was made. Parts of the runs were excavated and a careful examination made of the conduit, fittings, etc. The Ric-wiL Units were in practically perfect condition, the same as they were when installed, with no perceptible deterioration or other damage.

In 1949 a further check-up of all three installations was made. This investigation, as indicated by the quotations from the reports given above, showed all the lines still in constant use, functioning satisfactorily and trouble-free.

In the years since this original installation, in thousands of central heating and industrial processing projects, Ric-wiL Insulated Pipe Units, constantly improved by engineering research and development, **have continued to prove, through performance, their right to unchallenged leadership in this field.**

1. **HOUSING** of strong, shock-proof 16 gauge hot-dip galvanized Hel-cor conduit, spirally corrugated. Inside bonderized and coated with baked phenolic resin for additional protection.
2. **HIGH TEMPERATURE** asphalt coatings reinforced with tension wrapping of asphalt-saturated asbestos felt.
3. **INSULATION** of high thermal efficiency—any required type or thickness.
4. **PRESEAL RING** of steam-cured insulating cement protects units during shipping and installation.
5. **HEAVY IRON COLLAR** provides a firm foundation in making full-welded watertight field joints.

For complete information write for Ric-wiL Prefabricated Insulated Piping Systems Catalog 480-4. Address: The Ric-wiL Company, Dept. S-13.

RIC-WIL

INSULATED PIPING SYSTEMS

THE RIC-WIL COMPANY • CLEVELAND, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

"HOW-TO-DO-IT" BULLETIN

This guide to rail joint protection shows the NO-OX-ID application procedure, proper brushes to use, gives estimates on quantities, estimates the cost for various weights of rail. Not a promotional advertising piece, but a work sheet you can pass along to the foreman on the line. Get one copy, or several, without obligation.

Dearborn Chemical Company
310 S. Michigan Avenue
Chicago 4, Illinois

Please send me ( ) copies of your new Bulletin . . . "How To Protect Rail Joints."

Name ----------

Company ----------

Address ----------

City ---------- State ----------

Dearborn
Reg. U. S. Pat. Off.

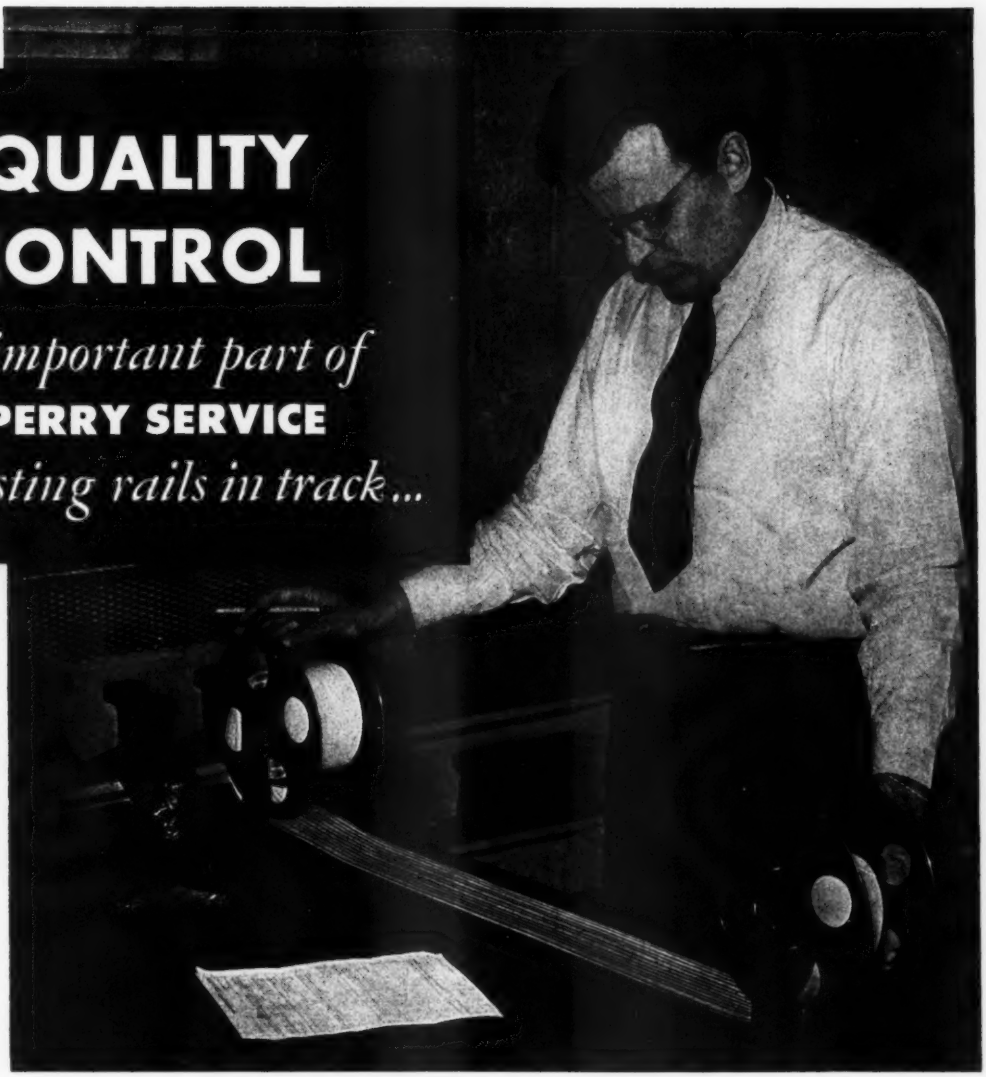
THE LEADER IN RUST PREVENTIVES AND BOILER WATER TREATMENT

DEARBORN CHEMICAL COMPANY

310 S. Michigan Ave., Chicago 4 • 807-15 Mateo St., Los Angeles
205 E. 42nd St., New York • 2454 Dundas St., West, Toronto

QUALITY CONTROL

an important part of
SPERRY SERVICE
for testing rails in track...



The Quality Control organization of Sperry Rail Service provides important benefits to the railroads, including:

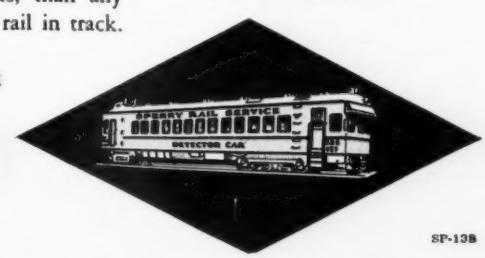
1. **Office inspection and analysis** of test results and service failures by technicians experienced in Detector Car operation and in rail defects.
2. **Field inspection** and analysis of Detector Car performance.
3. **Reports to railroads** and prompt, impartial follow-up of customer problems.
4. **Rail breaking program** in the field, in cooperation with the railroads, to check Detector Car performance.
5. **Recommended improvements** in equipment and operating procedures to the Sperry Operating and Engineering departments.

Quality Control is only one part of Sperry's rail testing service that goes far beyond the actual locating of defects in track. Exclusive "extras" are integral parts of Sperry Rail Service . . . now serving over 100 railroads. Together they contribute to the 20-year Sperry record of finding *more* and *smaller* transverse defects, as well as more longitudinal defects, than any other method of testing rail in track.

Other Sperry Rail Service "Extras"

- COMPILATION OF TESTING STATISTICS
- RAIL DEFECT MANUAL
- SPERRY REVIEW
- INSTRUCTION AND DATA SHEETS
- RESEARCH AND DEVELOPMENT OF NEW EQUIPMENT

WRITE FOR YOUR COPY OF THE SPERRY REVIEW, 1948 STATISTICAL ISSUE

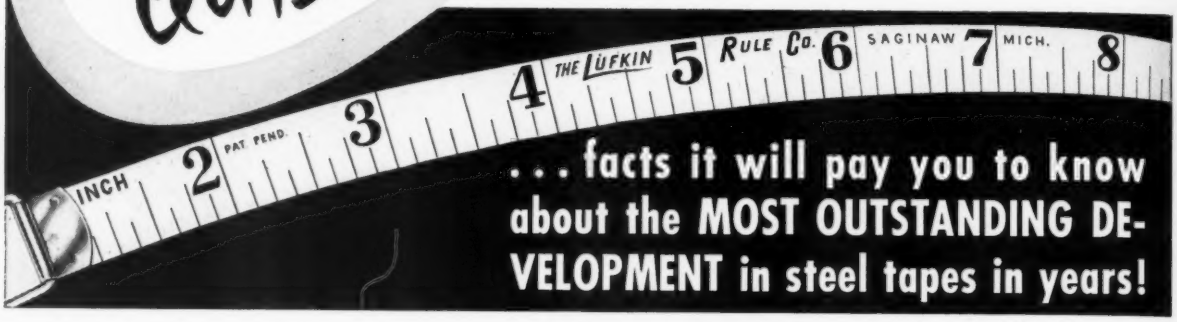


SPERRY RAIL SERVICE

Division of Sperry Products, Inc.
DANBURY, CONN.

SP-138

Quick Quiz ON LUFKIN CHROME CLAD STEEL TAPES



. . . facts it will pay you to know about the MOST OUTSTANDING DEVELOPMENT in steel tapes in years!

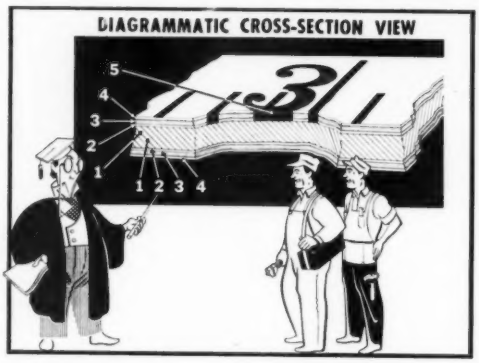
(Numerals Refer To Cross Section View)

Q. **Are the markings easier to read in sun or shade?**

A. Yes. Jet black markings (5) stand out sharply against the special non-glare satin finish of the heavy chrome plating (4). This finish absorbs light instead of reflecting into your eyes. Easy on the eyes—less stooping and squinting. Will not crack, chip or peel.

Q. **Are the markings more durable?**

A. Yes. The black markings bonded to steel are sunk below the hard, smooth chrome surface (5) thus protecting them against wear—even dragging over concrete or gravel. No metal is etched away. The markings remain easy to read even after years of rough usage.



Q. **Are the lines tougher—more durable—more resistant to kinks and breakage?**

A. Yes. The heavy chrome plating adds to the toughness of the hardened steel line (1). Kinking and line breakage are rare indeed.

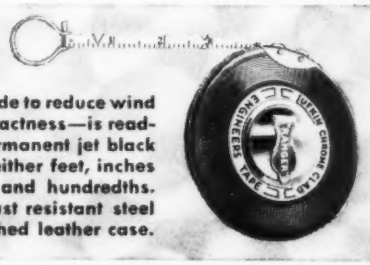
Q. **Do they resist rust and corrosion?**

A. Yes. A rust-resistant coating (2) plus multiple coats of electroplating (3) give remarkable protection against rust and corrosion. Years of grueling service in tropical damp, sea water, mines, oil fields and chemical plants have proven them resistant to rust and corrosion under conditions no other tapes can withstand.

Call for Lufkin Chrome Clad Steel Tapes at your dealers and prove these statements for yourself.

Buy steel tapes with easy-to-read markings that are durable

"RANGER" Model... Lufkin's Chrome Clad tape specially designed for engineers. The sturdy steel line—only ¼" wide to reduce wind resistance and provide compactness—is readily detachable from case. Permanent jet black markings are available in either feet, inches and eighths or feet, tenths and hundredths. Zero falls at end of line. Rust resistant steel liner protected by hand stitched leather case.

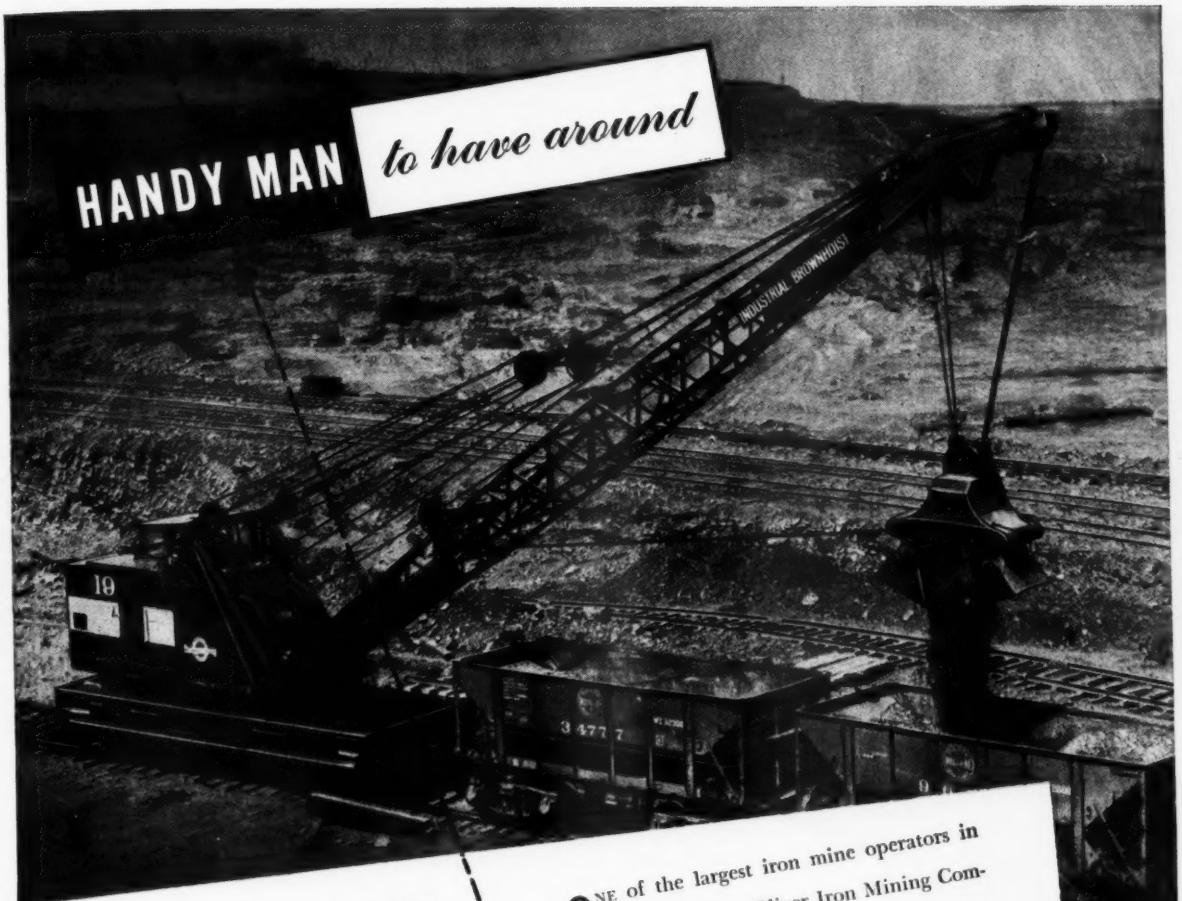


Buy LUFKIN

PRECISION TOOLS • TAPES • RULES FROM YOUR DISTRIBUTOR

THE LUFKIN RULE CO.

Saginaw, Michigan • New York City • Windsor, Canada



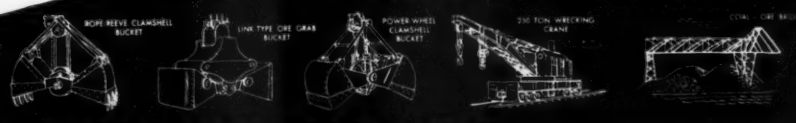
HANDY MAN *to have around*

Oliver Iron Mining Co. profitably uses five versatile Brownhoist Diesel Electric Locomotive-Cranes

ONE of the largest iron mine operators in the world, The Oliver Iron Mining Company, gets good steady day-after-day performance in the great Mesabi Range from five 60-ton BROWNHOIST DIESEL ELECTRIC LOCOMOTIVE-CRANES, such as the one pictured here. Track ballasting, relaying mine track, railing cars, and many other tough service jobs are assigned this husky Locomotive-Crane.

You can put this "handy man" to work in your operation for mighty small "keep." BROWNHOIST offers you a complete DIESEL ELECTRIC LOCOMOTIVE-CRANE line . . . 30 ton for general yard work; 50 ton for heavy duty bucket and magnet work with longer booms; and, the heavier 60 ton for work demanding an especially rugged, versatile machine. Write for complete data, today.

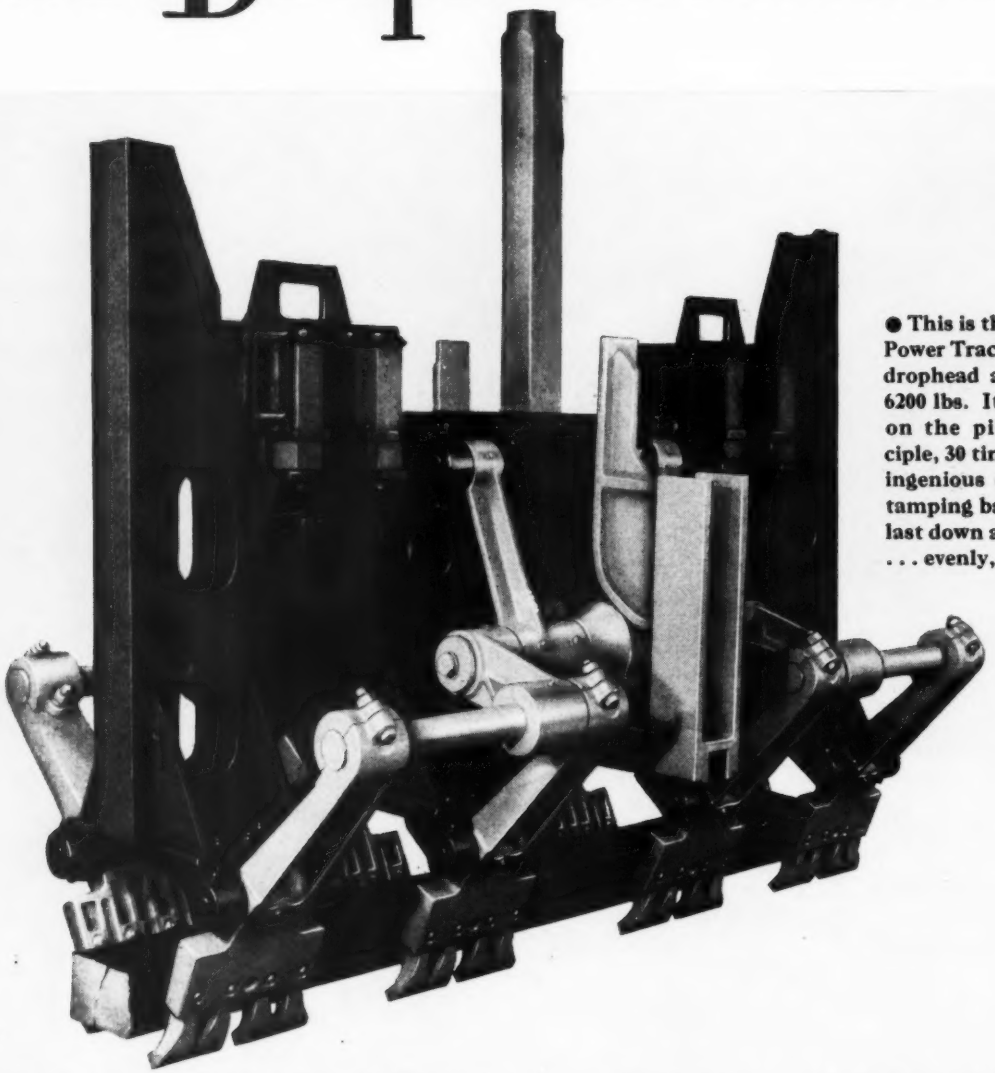
Brownhoist builds better cranes



INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN

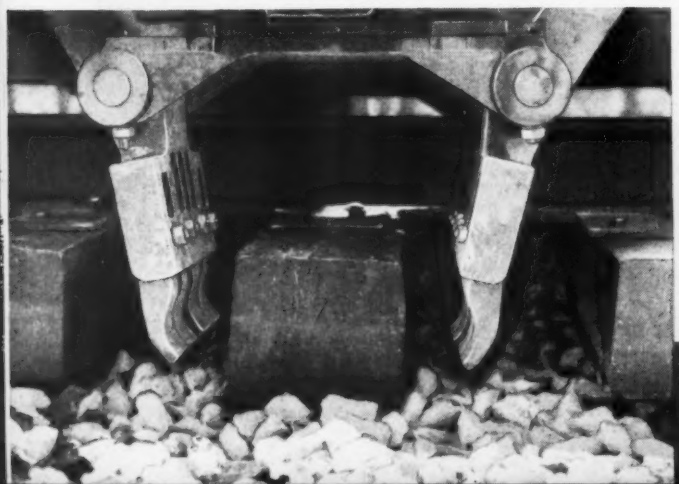
DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago. **AGENCIES:** Detroit, Birmingham, Houston, Los Angeles, Portland, Seattle, Spokane, Canadian Brownhoist Ltd., Montreal, Quebec.

this Drophead *does the*



● This is the "heart" of the Power Track Ballaster. This drophead assembly weighs 6200 lbs. It lifts and drops on the pile-driver principle, 30 times a minute. By ingenious cam action, the tamping bars drive the ballast down and under the tie . . . evenly, mechanically.

● Side view of the tamping bars. Tamping from both sides of the tie at once, pressure is directed downward and inward about two inches below the tie for uniform ballast compacting.



● Only when more ballast is needed . . . and *always* when needed . . . these feeding forks snap the ballast inward, their movements coordinated with the drophead's action. Their operation is completely automatic.

work of 48* men!

That's the money-saving, mass-production principle of the Pullman-Standard Power Track Ballaster. By mechanizing your maintenance gangs you will step up daily production, step down costs! One machine can tamp 450 to 500 track feet per *hour*, against the average of only slightly more track feet per *day*, using a multiple-power-tool hand tamping gang. Actual case histories prove savings as high as $1,000 per mile, and the finished work is uniform and long lasting! Write today for more facts . . . and interesting cost figures.

Send for this Booklet today!

Write for your personal copy of this 24-page brochure which gives the complete story of Pullman-Standard Power Track Maintenance equipment . . . the Power Cribber, the Ballast Cleaner and the Power Ballaster.

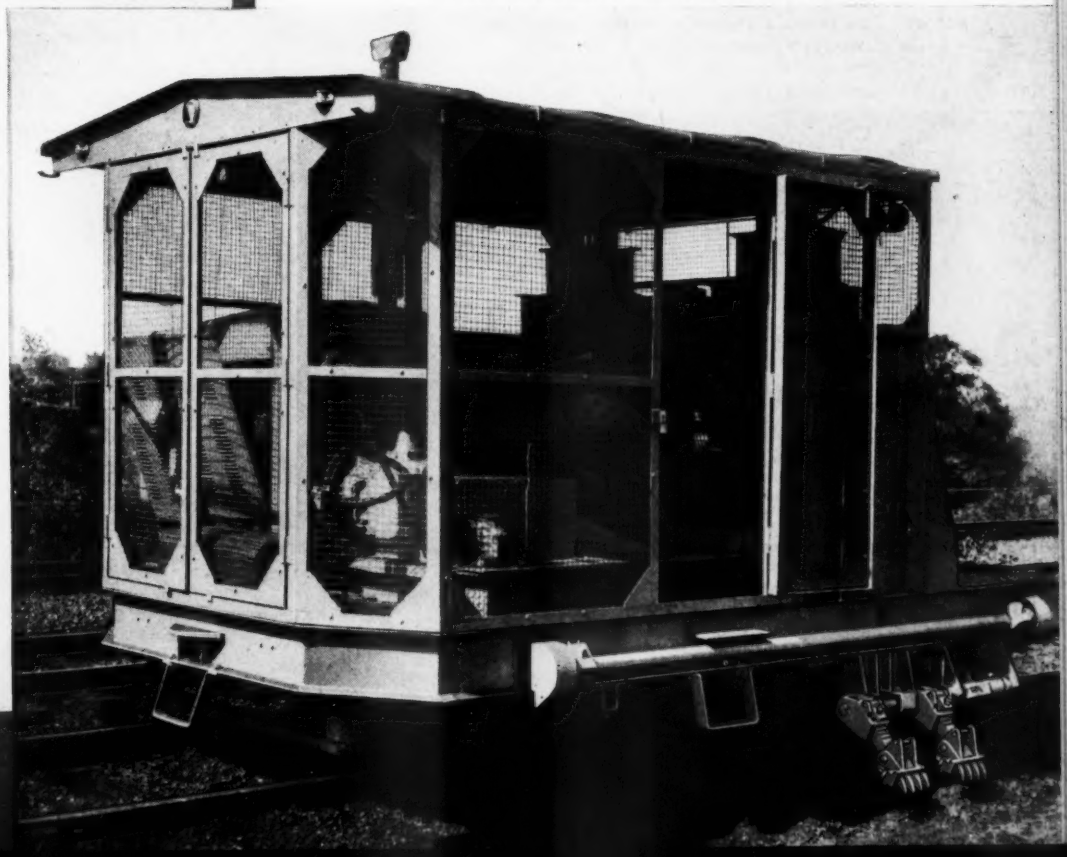
Pullman-Standard

CAR MANUFACTURING COMPANY

POWER BALLASTER DIVISION

79 East Adams Street, Chicago 3, Illinois

BIRMINGHAM 3, 1004 First National Building • CLEVELAND 15, 907 Midland Building
NEW YORK 17, 52 Vanderbilt Avenue • PITTSBURGH 19, 1115 Gulf Building
WASHINGTON 6, D. C., 1025 Connecticut Avenue, N.W.
SAN FRANCISCO SALES REPRESENTATIVE: MARK NOBLE



**This is a conservative figure based on a track-raising operation organized to permit continuous machine operation during the time the track is available.*

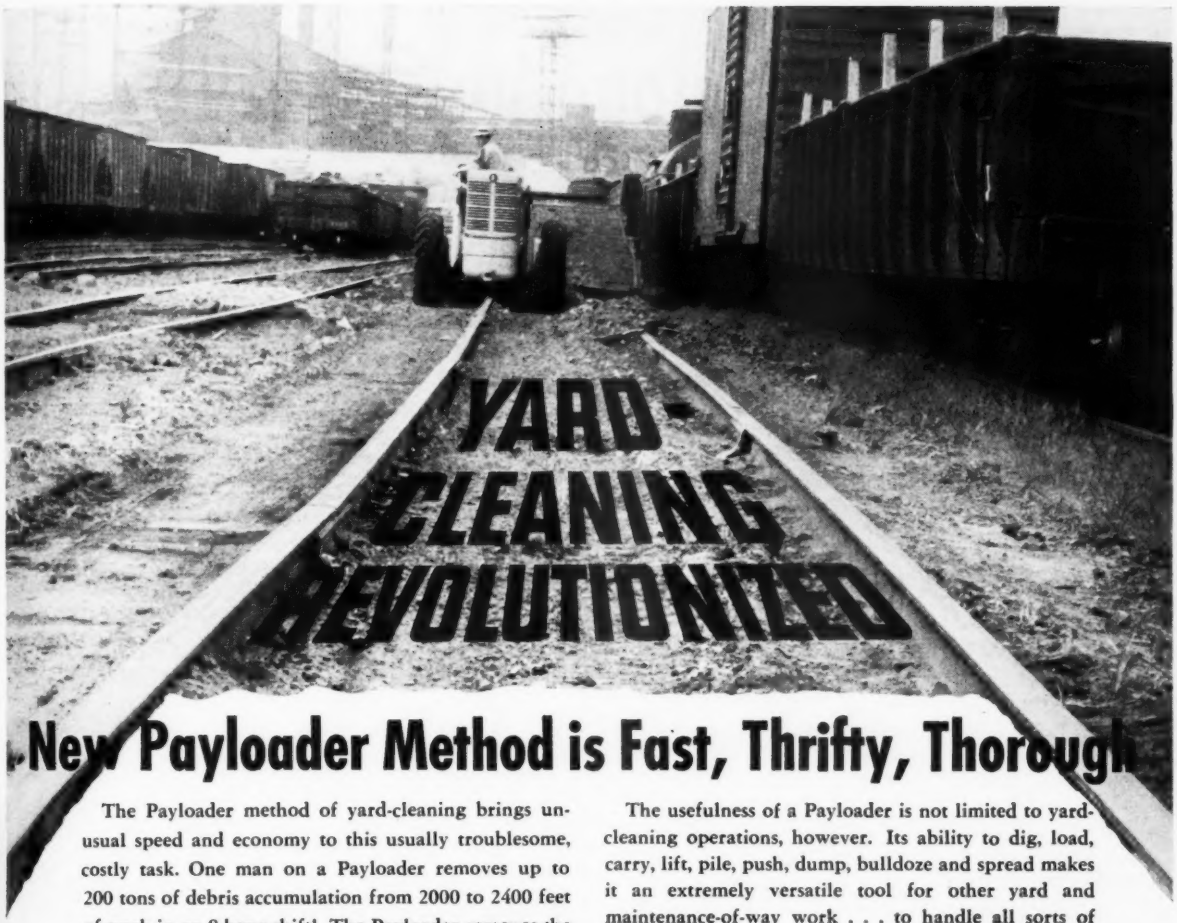
Fast-stepping workhorse...

Fast, safe, reliable transportation with maximum comfort and minimum back-work — that's this road-proved Fairbanks-Morse 58D Motor Car. Used by the hundreds by railroads the world over, it's one in the complete line of Fairbanks-Morse cars for all maintenance, inspection, signaling service. Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE,

a name worth remembering

DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS • SCALES
MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS
and STANDPIPES • FARM EQUIPMENT • MAGNETOS



YARD-CLEANING REVOLUTIONIZED

New Payloader Method is Fast, Thrifty, Thorough

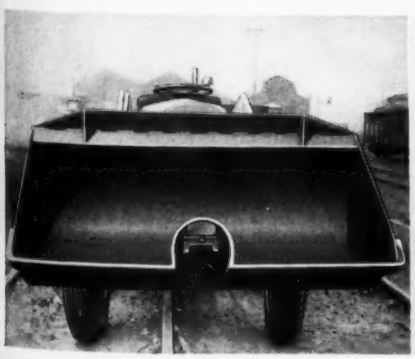
The Payloader method of yard-cleaning brings unusual speed and economy to this usually troublesome, costly task. One man on a Payloader removes up to 200 tons of debris accumulation from 2000 to 2400 feet of track in an 8-hour shift! The Payloader removes the refuse between the rails and tracks, carries its loads and dumps directly into railroad gondolas or trucks.

Key of the operation is the special bucket which has a central tunnel design that straddles the rail and digs on either side to a controlled depth. The large pneumatic tires of the Payloader walk over rails readily and provide tremendous traction for fast, efficient work.

The usefulness of a Payloader is not limited to yard-cleaning operations, however. Its ability to dig, load, carry, lift, pile, push, dump, bulldoze and spread makes it an extremely versatile tool for other yard and maintenance-of-way work . . . to handle all sorts of loose materials, to excavate, grade, load coal, clean up, remove snow, etc.

The special yard-cleaning bucket can be interchanged in a few minutes with the standard bucket, Bulldozer Blade or Crane Hook attachments. Full facts on Payloaders for yard-cleaning and other uses are yours for the asking. The Frank G. Hough Co., 751 Sunnyside Avenue, Libertyville, Illinois.

HOUGH
PAYLOADER
Manufactured by THE FRANK G. HOUGH CO.



The Special Bucket is 6 feet wide and straddles the rail. A Guide Shoe insert in the tunnel rides the rail . . . keeps bucket centered and limits depth of cut . . . is adjustable for various sizes of rail.

Right down the rail goes the Payloader without delay cutting to full depth allowed by the guide shoe. As soon as the bucket is full, it carries and dumps the load directly into gondola or truck.

They ride along in Safety...

ON CF&I RAILS

YES they ride in safety on CF&I rails...*quality* rails and accessories...made with a know-how gained from 67 years' experience in developing processes and controls which assure a *quality* product.

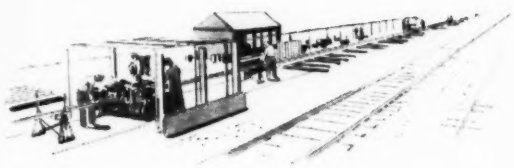
Every step in production, from the raw materials to the finished rail, is an integral part of CF&I's operation, providing rigid *quality* control otherwise impossible.

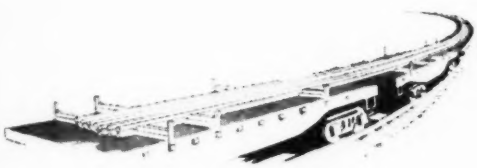
CF&I

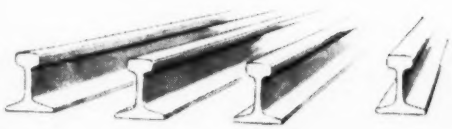
The Colorado Fuel and Iron Corporation

GENERAL OFFICES: DENVER, COLORADO

NOW is the time to plan your 1950 Rail Welding Program







When you are planning continuous rail for open track tunnels, bridges, or stations, call in your OXWELD representative.

—Talk the whole plan over with him. He will arrange the scheduling of an OXWELD pressure unit and show you the most economical methods based on our experience of over 10 years in this operation.

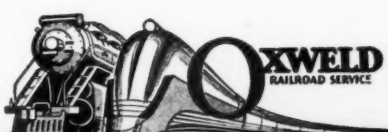
—He'll help you pick a welding location for the OXWELD six station pressure welding set-up.

—He'll plan your transportation method for long lengths with equipment you now have . . . flat cars, skid rails, or push cars and buggies.

—Just specify in your next rail order that rail ends must be undrilled, unbeveled, and unhardened.

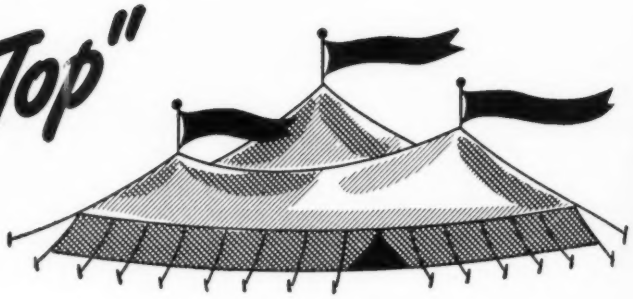
—We repeat, now is the time to plan your 1950 rail welding program. Include pressure-welding in your 1950 budget.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York
In Canada:
Canadian Railroad Service Company, Limited, Toronto



SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

Take a Tip From The "Big Top"



Ever watch a circus tent go up? You'll get an even greater kick watching the erection of your ARMCO STEELOX Building.

Like the "Big Top" it goes up in a jiffy, and if necessary can always be moved to a new location. But there the similarity ends. With STEELOX you have all the added advantages of a permanent structure. These attractive buildings are weathertight, fire-resistant, and lightning-safe when properly grounded.

Long life is assured because STEELOX Sections are made of 18- and 20-gage ARMCO ZINCGRIP-PAINTGRIP Steel. This durable material is 2 to 3 times heavier than ordinary galvanized siding and roofing. About the only maintenance ever required is an occasional painting. Even here you save, as the Special-Purpose ARMCO Steel takes paint without pre-treatment and holds it longer.

ARMCO STEELOX Buildings are ideal for yard offices, waiting stations, tool houses, Diesel motor garages, machine shops and wherever else you need efficient, economical shelter. There is a type and size for every need, with widths from 4 to 36 feet, lengths from 4 to 200 feet or more. Write for prices and other data. Armco Drainage & Metal Products, Inc., 2895 Curtis St., Middletown, O. Subsidiary of Armco Steel Corp.

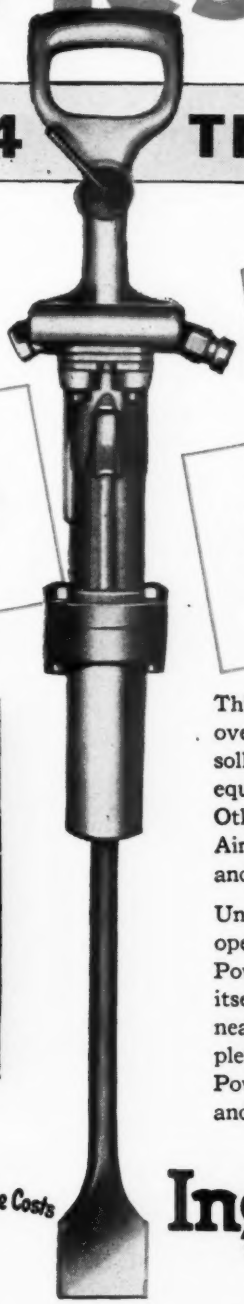
Export: The Armco International Corporation

ARMCO

ARMCO STEELOX BUILDINGS

40% less air

with the MT-4 TIE-TAMPER



The greatest Tamper for ease of handling.

Takes less air . . . permitting operation of more tampers from your present compressor equipment.

Powerful . . . the same or even more blows than tampers you are now using.

Rugged and constructed of simple parts for longer life with less attention.

MT-4 Tamping Guns operating from a DR-60 compressor

This new Tamping Gun is the result of over 35 years of continual efforts by Ingersoll-Rand in developing and improving equipment for the Railroad Industry. Other I-R equipment includes all types of Air Tools and a complete line of on-track and off-track compressors.

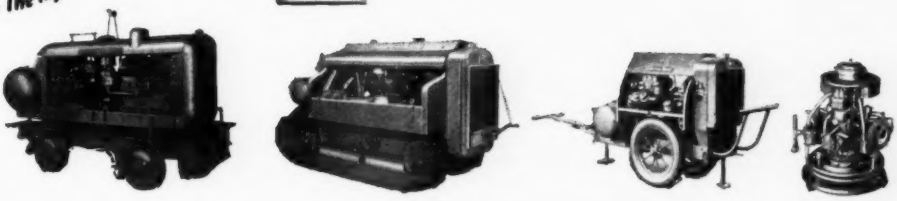
Under today's conditions there are many operations on which Ingersoll-Rand Air-Power equipment saves enough to pay for itself in a matter of days. Consult the nearest Ingersoll-Rand branch for complete information on proven I-R Air-Power equipment for bridge-and-building and maintenance-of-way work.

AIR POWER ... The Key to Lower Maintenance Costs

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 417-11

The Originator of Mechanical Tamping



Compressors for Railway Maintenance Work

Weeds are Your Problem . . Weed Control is Our Business

CHIPMAN CHEMICAL COMPANY, INC.

CHICAGO • HOUSTON • BOUND BROOK, N. J. • PALO ALTO • PORTLAND

Railroad Weed Control Service Since 1912

A COMPLETE LINE OF WEED KILLING CHEMICALS

A TIME-SAVING TIE-IN

This No. 53 motor car with cab top is one of Fairbanks, Morse & Company's latest models. It is a versatile piece of equipment, always ready to haul men and material of any kind with equal efficiency and economy.

Characteristically, the No. 53 is equipped with Timken tapered roller bearings on all axles. Timken bearings assure smooth, frictionless operation; eliminate wear on axles; carry all loads — radial, thrust and both together; help to maintain wheel gauge and minimize wheel breakage; reduce lubrication and maintenance.

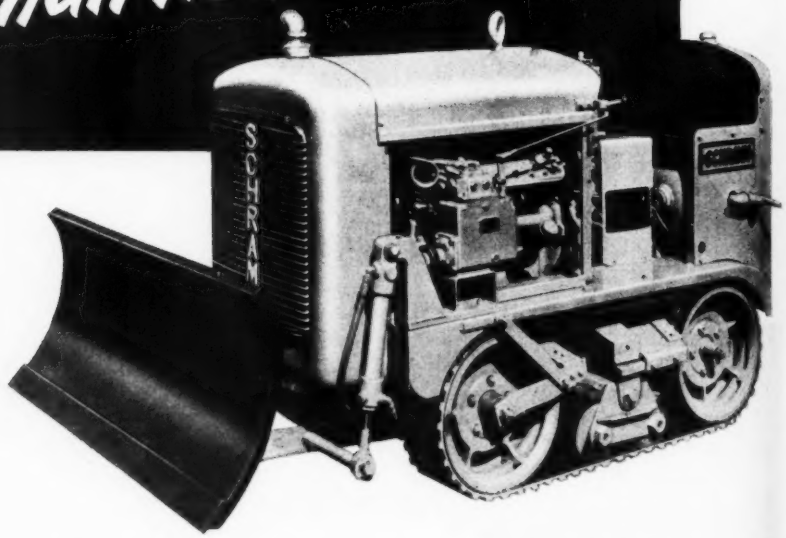
Keep your rail cars on the road — out of the shop; make sure they are equipped with Timken bearings — just like modern main-line cars and locomotives.

THE TIMKEN ROLLER BEARING COMPANY, CANTON 6, OHIO
Cable Address "TIMROSCO"

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION →✳←

Same work to do... Fewer man-hours to do it



What a Chance for the SCHRAMM MODEL 60 CRAWLER!

Quality SCHRAMM Features . . .

Balanced Power. Two compressor and two power cylinders balanced in each side of V-8 block.

Positive Cam-Operated Intake Valves with SCHRAMM patented unloader that holds valves open during unloading.

Pressure Lubrication to all main and crank pin bearings; spray and splash to all interior parts.

Electric Starting with heavy-duty storage battery and battery charging generator.

Transmission; 4 forward speeds and reverse. Famous SCHRAMM dependability throughout.

Other SCHRAMM compressors range from 20 to 420 cubic feet actual air capacity; portable and stationary; gasoline, diesel and electric driven.

Under the 40-hour week, greater mechanization is an absolute MUST! Yet you can't afford a special machine for *every* job, particularly the occasional one. So consider this *single* machine, adaptable to *many* uses besides its main one. Basically it's for your most important work — tie-tamping — and most other compressed air jobs on the railroad, because its powered crawler treads take it *anywhere*. *In addition,* it's a light tractor, a back-filler, snow plow for station and yard areas, or power for belt-driven machinery. It's the SCHRAMM Model 60 Crawler, a rugged, compact mobile compressor that's made a hit with maintenance men everywhere. No other compressor matches its versatility. And certainly none is more dependable. For it is built and proudly offered by America's oldest exclusive compressor manufacturer.

You'll want full details, of course. To get them, drop a line to "the compressor people" today. Ask for Bulletin FC 49.

SCHRAMM INC.

THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

Still sound and serviceable after 30 years in salt water...

MARINE BORERS in salt water frequently honeycomb untreated piles in three to six months. But **pressure penetration** of Koppers Creosote gives marine piles a serviceable life span of more than thirty years for railroad water front installations. Case histories prove these facts.

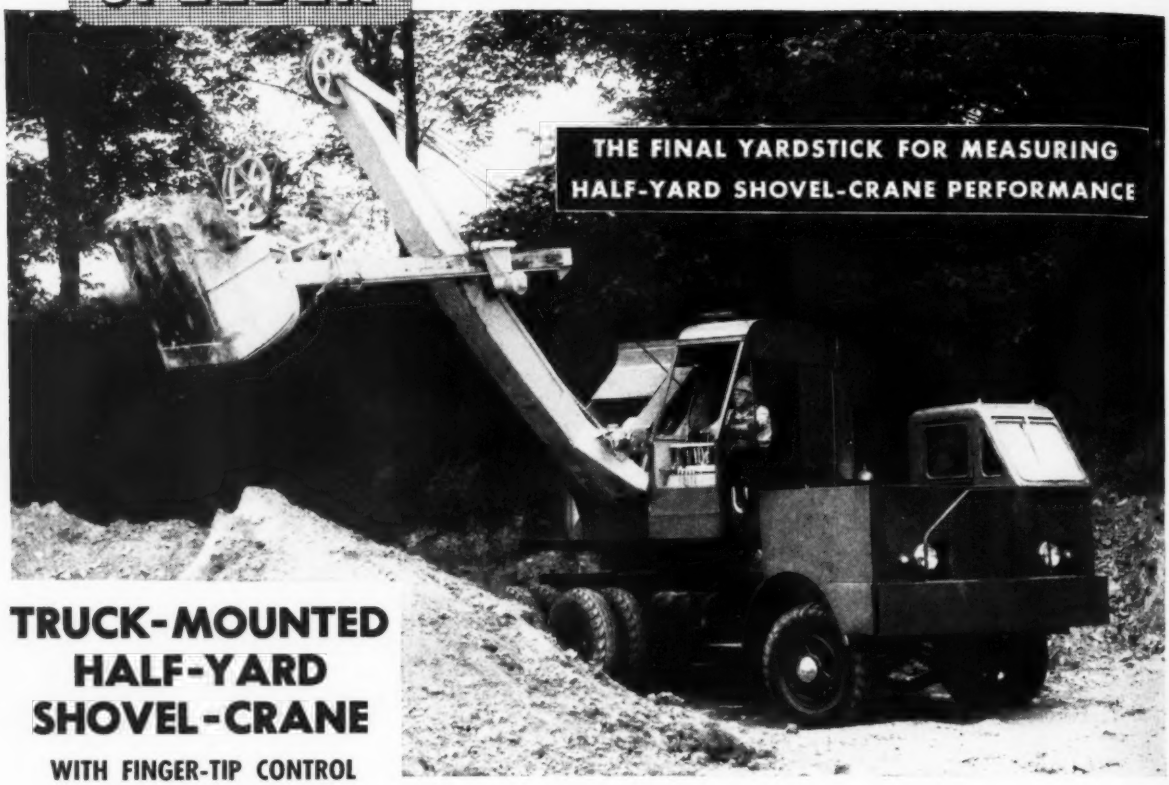
Besides long-lasting service, Koppers Pressure-Creosoted Piles offer **economy** . . . low first cost and low maintenance cost. Additional years of extra service represent a clear and substantial saving . . . the dividends paid by pressure-creosoting. Koppers Pressure-Creosoted Piles, unlike other permanent materials, do not spall or rust.

Koppers is a specialist in the pressure treatment of wood for railroads. Whether your problem involves the treatment of marine or foundation piles, posts, poles, grade crossings, bridges, or lumber for building construction, you'll get the latest technical information, the best products, and the quickest service from Koppers.

KOPPERS COMPANY, INC.
Pittsburgh 19, Pa.

KOPPERS **PRESSURE-TREATED WOOD**

LINK-BELT SPEEDER HC-51 With Speed-o-Matic Hydraulic Controls



TRUCK-MOUNTED HALF-YARD SHOVEL-CRANE

WITH FINGER-TIP CONTROL THAT BOOSTS OUTPUT UP TO 25%

WHAT SPEED-O-MATIC MEANS

Variable pressure valves give finger-tip control, constant "feel" of load. Faster operating cycles, precision control of every movement, elimination of operator fatigue boost production up to 25% over manually operated machines of same basic capacity. Absence of mechanical linkage simplifies servicing, greatly reduces maintenance.

Fast, flexible, mobile . . . that's the 6-wheel version of the new ½ yard Link-Belt Speeder Shovel-Crane, the HC-51, with a 12½ ton lifting capacity. All the advantages of Speed-o-Matic hydraulic control, formerly available only on 1½ yard machines or larger, are combined with new, advanced features of design on both truck and crane, to give speed to the job, high maneuverability, and the utmost ease of operation and precision control. All add up to greater output at less cost.

FEATURES THAT MAKE THE HC-51 THE OUTSTANDING MACHINE IN ITS CLASS

Specially designed truck, 10 speeds forward (up to 30 m.p.h.), 2 speeds reverse.

Walking beam rear axles allow full traction on rough terrain, even tire wear, greater stability.

Removable rear outrigger.

All-welded frame construction, both crane and truck.

Independent safety boom hoist, power raising and lowering.

Front drum reverse mechanism available for power controlled load lowering.

Same engine in truck and crane, simplifying service and repair parts stock.

All clutches except one, in upper, completely interchangeable.

All shafts and gears in anti-friction bearings, except slow-speed, intermittently used swing shaft in bronze bearings.

Splined shafts throughout.

All clutches, brakes and gears readily accessible and easily serviced.

11.632

LINK-BELT SPEEDER

LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA

LBS LINK-BELT-SPEEDER CORPORATION

Builders of the Most Complete Line of SHOVELS-CRANES-DRAGLINES

For additional information, use postcard, pages 947-948

ANCO Nuts-

On *to stay*
Off *at will*

LOW IN COST . . .
RE-USABLE OVER AND OVER

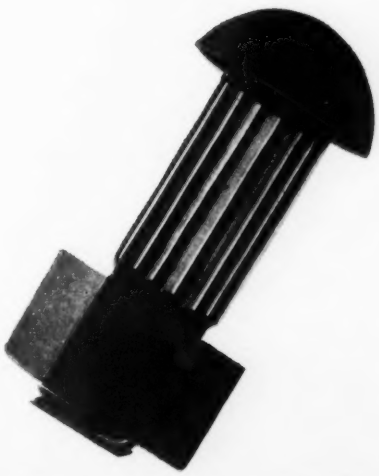
ANCO nuts are fully as reliable as expensive looking devices but comparable in price to ordinary nuts and lock washers. They are ONE PIECE—with no loose parts to become separated—and easily applied by unskilled labor. The locking pin is stainless steel and impinges between the protruding threads of the bolts, maintaining a secure anchorage against vibration and shock. Yet Anco nuts are easily backed off with a wrench and can be re-applied many times.

They have been proved in service by the millions on railroads, in construction, and by industry. Anco nuts are perfect for every purpose. Best for crossings . . . frogs . . . guard rails . . . rail braces . . . work equipment . . . bridges and scores of other places. Why not get complete information and testing samples of Anco nuts? A word on your letterhead does it.

Better than rivets for general steel construction, bridges and trestles . . .

STRUCTURAL RIB BOLTS

STRUCTURAL RIB BOLTS offer many advantages over rivets for steel work. When driven into a hole in the work with an ordinary hammer, the triangular ribs deform to make a body-bound fit and lock bolt in position. Only two men with a hammer and wrench are needed to apply; riveting requires three or four men with riveting forge, compressor, and riveting hammer. Fast, stronger, dependable, they assure lower construction costs. Use them with ANCO nuts for permanency.



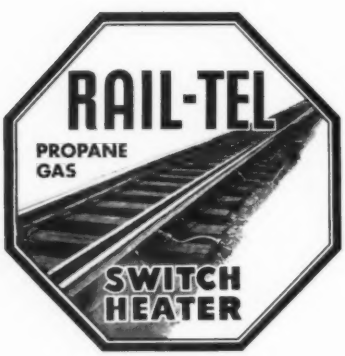
AUTOMATIC NUT COMPANY
LEBANON, PENNSYLVANIA

Chicago Office—310 S. Michigan Ave.

Warehouse—Michigan City, Indiana

R. J. Voss—District Engineer

RAIL-TEL switch heaters keep yard traffic *Free Flowing*



Above is shown a typical example of what can be accomplished during a winter storm with propane gas switch heaters. At the first sign of snow, these efficient, low-cost heaters go into action. Big storm or little storm—you are protected for the duration—traffic remains fluid throughout the yard.

These propane gas switch heaters are equally valuable out along the line providing reliable, economical protection for your spring and power switches. They are particularly useful in C.T.C. territory. RAIL-TEL Switch Heaters are operated by manual control but are designed so that they may be used with remote control if desired. The Rails Company furnishes Hot Wire and Electronic (Spark) Automatic Ignition Units for operation with C.T.C., Carrier, or Direct Wire control from the nearest tower, on either A.C. or D.C. current. These heaters are simply installed and propane gas is supplied through pipe lines from cylinders of various capacities in manifold, or bulk storage tanks.

Keep your switches open the modern—economical way—*use propane gas.* Act *now* before winter sets in.

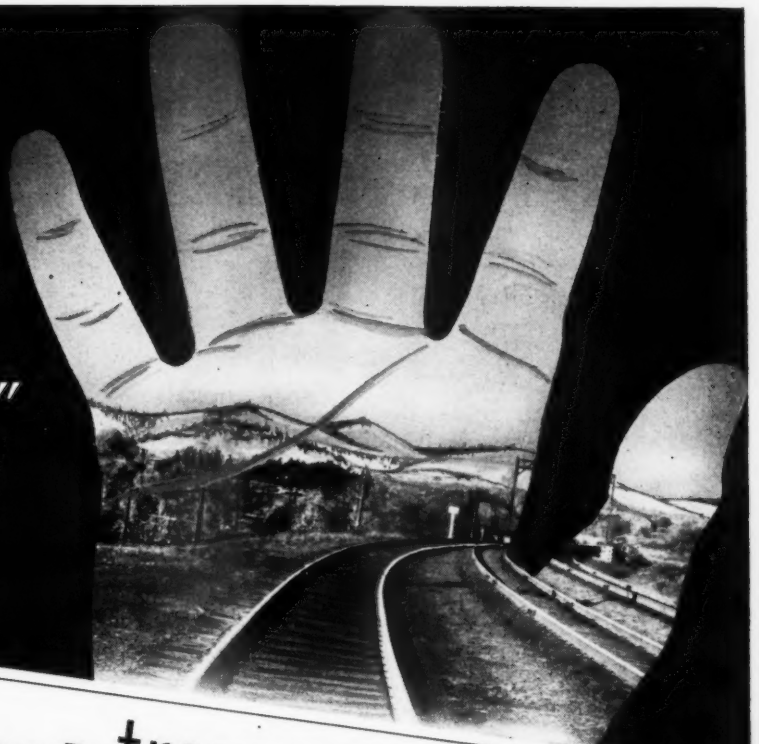
THE RAILS COMPANY

General Office
178 GOFFE STREET, NEW HAVEN 11, CONN.

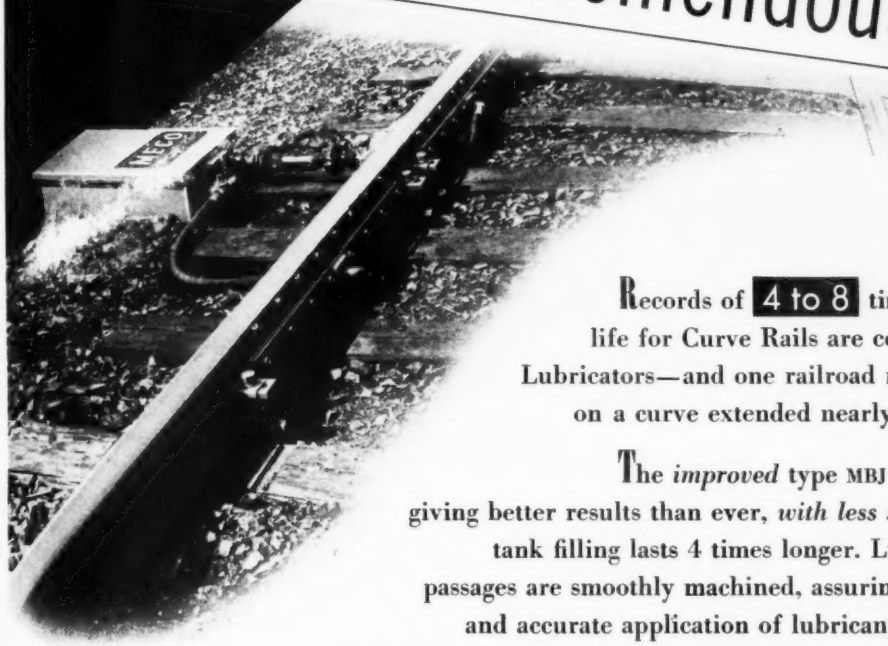
ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, ILL.

For additional information, use postcard, pages 947-948

curve rail "life expectancy"



increased tremendously!



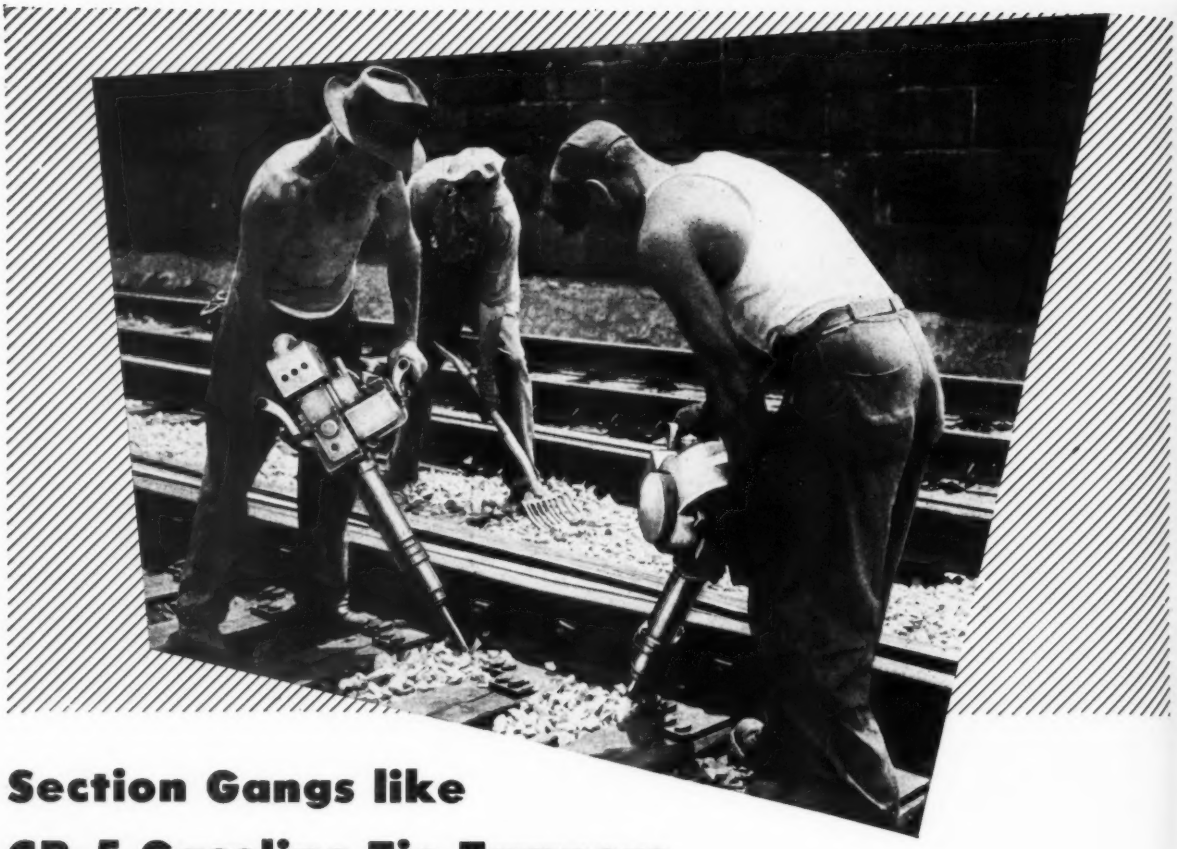
Records of 4 to 8 times longer life for Curve Rails are common with MECO Lubricators—and one railroad reports rail life on a curve extended nearly 15 times!

The *improved* type MBJ MECO Lubricator is giving better results than ever, *with less servicing.* One tank filling lasts 4 times longer. Lubrication passages are smoothly machined, assuring positive, uniform and accurate application of lubricant to the rails.

The *improved* type MBJ MECO can be re-applied to the new rail when track is re-laid. If the rail is of a different size, clamps to suit the new rail are required.

★ **Maintenance Equipment Company** ★

RAILWAY EXCHANGE BUILDING • CHICAGO 4, ILLINOIS



Section Gangs like CP-5 Gasoline Tie Tampers

because —

Starting is quick and easy — by pressure on one of the grip handles.

Balance is perfect — weight is centered between grip handles.

View of work is unobstructed, because of compact engine design and slender contour of lower end of tool.

Vibration is minimized in grip handles by air-cushioning of return stroke of free-throw striking piston — machine life is prolonged.

Magneto provides efficient ignition system under all conditions — there are no batteries, thus eliminating costly battery replacements.

Standard two-cycle engine operates on gasoline-oil fuel mixture — oil in fuel provides automatic lubrication.

Write for Bulletin 1943
Maintenance-of-Way Equipment

OTHER CP MAINTENANCE-OF-WAY AND TRACK EQUIPMENT

Air Compressors — Patrol, Crawler, Flanged Wheel Mounted . . . Pneumatic Tie Tampers . . . Reversible Pneumatic Impact Wrenches . . . Wire Brush Machines . . . Boyer Rivet Busters . . . Scalers . . . Spike Drivers . . . Nut Runners . . . Concrete Vibrators . . . Winches . . . Rotary Drills . . . Wood Borers . . . Portable Electric Saws.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

For additional information, use postcard, pages 947-948

ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index

A

Adzes 1016
Adzing Machines 999
Air Compressors 940, 946
Air-Cooled Engines 1002, 1015
Air Dump Cars 918
Aluminum Track Jacks 921, 1017
Anchors, Rail 913, 995, 1017, 1020
Arc Welders 949
Asphalt Emulsion Coatings 923

B

Ballast Cleaners 930, 931
Ballast Extruders 1005
Bars 1016
Boiler Water Treatment 926
Boilers 1010
Bolting Machines 951
Bolts 943, 1017
Books 1006, 1014
Building Materials 923
Buildings 936
Bulldozers 922, 933, 940

C

Car Cements 923
Car Pullers 1009
Car Replacers 1018
Chain Saws 992-994
Chisels 1016
Chromated Zinc Chloride 1000
Clamshell Buckets 929
Coal Bridges 929
Cooling Stations 1013
Compressors 940, 946
Compromise Joints 924, 1018
Concrete 1012
Concrete Vibrators 946
Construction Contractors 1001
Contractors 1001
Cranes 917, 929, 942, 949, 1006, 1011
Crawler Compressors 940
Crawler Cranes 917, 949
Crawler Shovels 917
Crawler Tractors 922
Crawlers 940
Creosoted Treated Piles 941
Cribbing Machines 930, 931
Crossing Spring Washers 914
Crossings 954

D

Derails 1018
Diesel-Electric Cranes 929
Diesel Engines 946
Draglines 917, 942
Drainage Contractors 1001
Drills 916, 999, 1005
Dump Cars 918

E

Earthmoving Equipment 922, 933, 940
Electric Car Pullers 1009
Electric Plants 1013
Electric Saws 946
Electric Snow Melters 1018
Electric Tie Tampers 993
Electrodes 949
Engines 1002, 1015
Excavators 949
Eye Protection 1012

F

Fasteners 1017
Flangeway Brackets 1018
Flangeway Cleaners 920
Foot Guards 1018
Forks 1016
Frog Spring Washers 914

G

Gas Switch Heaters 944
Gasoline Engines 1002, 1015
Gauge Holders 1011
Gauge Rods 1018
Gauging Tools 1018
Generators 1013
Goggles 1012
Grinders 1005
Guard Rail Bolts 1017
Guard Rail Clamps 1018
Guard Rails 954, 1018

H

Hammers 1016
Heel Guards 1018
Hoists 949
Hydraulic Jacks 1017

I

Impact Wrenches 946
Industrial Waste Surveys 1008
Insulated Piping Systems 925
Insulation Coatings 923

No Postage Stamp Necessary If Mailed in the United States

Postage Will be Paid by Addressee

BUSINESS REPLY CARD
First Class Permit No. 32418, Sec. 510, P.L.&R. Chicago, Ill.

RAILWAY ENGINEERING & MAINTENANCE
30 CHURCH STREET
NEW YORK 7, NEW YORK

READER SERVICE DEPT.

RAILWAY ENGINEERING AND MAINTENANCE October, 1949

Please send me additional products information as requested below.

☐ Literature Only ☐ Desire to see Representative ☐ Price Data

Product and Page No. .....
" " " " .....
" " " " .....
" " " " .....

Name .....

Title or Position .....

Company .....

Address ..... City ..... Zone ..... State .....

(Please Fill Out Card in Full)

J

Jacks 921, 1017
Jeep Attachments 988
Jeeps 988

K

Kerosene Switch Heaters 915

L

Lag Screws 1017
Lever Jacks 1017
Locomotive Cranes 929

M

Mastic Flooring 923
Mauls 1016
Mechanical Tie Tampers 930, 931
Mobile Cranes 1011
Motor Cars 920, 952

N

Nut Runners 946
Nuts 943

O

On-Track Cranes 1006
On-Track Tampers 930, 931
Overhead Cranes 949
Oxy-Acetylene Service 935

P

Pads 1003
Pentachlorophenol 1007
Picks 1016
Pipe Cleaning Service 1008
Pipe Coating 1008
Pneumatic Tie Tampers 937, 940, 946
Portable Rollers 1012
Power Plants 993
Prefabricated Buildings 936
Prefabricated Insulated Piping 925
Pressure-Treated Wood 941, 1000, 1007
Protective Coatings 923
Pullers 1016
Pullshovels 917
Pumps 1016, 1017
Punches 1016

R

Rail 934
Rail Anchors 913, 995, 1017, 1020
Rail Braces 954
Rail Cranes 1006
Rail Drills 916, 999, 1005
Rail Holders 1011
Rail Joint Protection 926
Rail Joints 924
Rail Layer 990
Rail Lubricants 945
Rail Lubricators 954
Rail Service 927
Rail Testing Service 927
Rail Tongs 1018
Railroad Books 1006, 1014
Remote Control Apparatus 994
Remote Control Gas Switch Heaters 944
Rivet Busters 946
Rock Drills 946
Roller Bearings 939
Rollers 1012
Rotary Drills 946
Rules 928
Rust Joint Iron Injector 992
Rust Preventives 926, 1004

S

Scalers 946
Screw Jacks 1017
Self-Locking Nuts 943
Sewer Surveys 1008
Sheet Metal 1012
Shovels 917, 942
Skid Shoes 1018
Sledges 1016
Snow Flangers 1018
Snow Loader-Melters 1013
Snow Melters 1018
Snow Plows 1014, 1018
Soil Stabilizers 949
Spike Drivers 946, 999
Spike Hammers 999
Spike Pullers 999
Spring Washers 914, 991, 1015, 1019
Steam Generators 1010
Steel Buildings 936
Steel Rail 934
Steel Tapes 928
Structural Bolts 943
Structural Designs 1006
Surveying Books 1006
Switch Heaters 915, 944
Switch Point Guards 1018
Switch Points 954
Switch Rods 954
Switch Stands 954

T

Tapes 928
Text Books 1006, 1014
Tie Pads 1003
Tie Tampers 919, 930, 931, 937, 940, 946, 993
Tie Tamping Guns 937
Timber Bolts 1017
Tongs 1016
Track Jacks 921, 1017
Track Tools 1016
Track Wrenches 951, 999
Tractors 922, 994, 1012
Treated Crossties 1007
Truck Cranes 917, 942, 949, 1011
Truck Pullshovels 917
Truck Shovels 917, 942
Turbine Pumps 1017

U

Unit Tie Tampers 919, 946

V

Vacuum Pumps 946

W

Washers, Spring 914, 991, 992, 1015, 1019
Waste Disposal Plants 1008
Water Treatment 926
Weed Control Service 938, 997
Weed Killer 992
Weed Killing Chemicals 938, 997
Well Water Systems 1017
Wheel Stops 1018
Wheel Tractors 922
Winches 946
Wire Brush Machines 946
Wood Borers 946
Wood Preservatives 941, 1000, 1007
Wrecking Cranes 929
Wrenches 1016

Y

Yard Cleaners 933

RAILWAY ENGINEERING AND MAINTENANCE October, 1949

Please send me additional products information as requested below.

☐ Literature Only ☐ Desire to see Representative ☐ Price Data

Product and Page No. .....

" " " " .....

" " " " .....

" " " " .....

Name .....

Title or Position .....

Company .....

Address ..... City ..... Zone ..... State .....

(Please Fill Out Card in Full)

Postage Will be Paid by Addressee

BUSINESS REPLY CARD

First Class Permit No. 32418, Sec. 510, P.L.&R. Chicago, Ill.

No Postage Stamp Necessary If Mailed in the United States

RAILWAY ENGINEERING & MAINTENANCE

30 CHURCH STREET

NEW YORK 7, NEW YORK

READER SERVICE DEPT.

Here's the Outstanding DC Arc-Welder Development of All Time

The *New* P&H NEMA-Rated Model WFA 300

(Welding Service Range 60-375 amps)

The only DC Welder with time- and money-saving Dial-lectric control — a compact, light-weight unit that runs at the life-preserving speed of 1750 rpm.

Here's a DC welder that can reduce your welding costs . . . P&H's new model WFA 300.

Just check these features:

LIFETIME SEALED BEARINGS —no lubrication needed.

PUSH-BUTTON START AND STOP SWITCH —overload protection.

CLASS B. GLASS INSULATION — highest quality available.

COMPACT DESIGN — uses little or no floor space.

DUAL-FAN COOLING SYSTEM — the coolest welder you have ever seen.

STATIONARY OR PORTABLE MOUNTINGS.

LOWEST RPM PER POUND OF WEIGHT

QUIET — you hardly know it's running.

REMOTE CONTROL — full arc control at the work.

DIAL-LECTRIC CONTINUOUS CONTROL

POLARITY SWITCH — an extra feature at no extra cost.

HIGH-LOW RANGE — requires only a flip of a switch.

GREATER MOBILITY — only 695 lbs.

Get all the facts about this new, outstanding DC Welder. Call your P&H representative or write us for Bulletin W-80.

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-Assembled Homes

P&H ARC WELDERS

4420 W. National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

WELDING ELECTRODES • MOTORS • HOISTS P&H ELECTRIC CRANES • ARC WELDERS • EXCAVATORS

No. 250 of a Series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

79 W. MONROE STREET
CHICAGO 3, ILL.

Subject: "Are You Listening?"

October 1, 1949

Dear Readers:

A letter received during the past month from the head of a marketing research organization cites an interesting incident and asks several questions, the answers to which are important—vitally important—to us.

He says that at a recent meeting of serious, well-informed businessmen, which he attended, one of the speakers read his speech and almost never looked up to see if his audience was listening. Some in the audience, the writer observed, were definitely not listening, others were only half listening—either because the material was not well presented, or it did not give them the vital and useful information they had reason to expect.

This, he said, made him think about magazine publishers and their audiences, and he asked us if we have looked at our audience recently to see if you are listening?—Whether we are giving you the kind of material which will keep you abreast of developments in your field and help you in your work? You may know who gets your magazine, he said, but repeated, "Are they listening?"

Our answers to these questions are that we of Railway Engineering and Maintenance are constantly looking at you—our audience; that we are constantly striving to bring to you the kind of material that will interest and help you most; and that we have every reason to believe that "you are listening".

More than fifty unsolicited letters from you—our audience—railway men and railway supply men—received during the last month, plus innumerable personal comments within the same period—all referring favorably to our September, Pre-Convention and Exhibit-in-Print issue, indicate that we can't be far off the beam, and that you are, indeed, "listening". And they stir within us—as editors of the only publication devoted exclusively to the problems of you maintenance officers, and your suppliers-renewed determination to stay on the beam, and keep you "listening".

In this current issue of Railway Engineering and Maintenance—our Roadmasters' Convention number—we bring you more on-the-beam information about your problems and methods for their solution, including all of the Roadmasters' technical committee reports, in full, as presented before the convention—reports that would not come to your attention in any other publication for many months, at best.

Could we be wrong—that we are off the beam—that you are not listening? If you think so, we shall be glad to have you tell us.

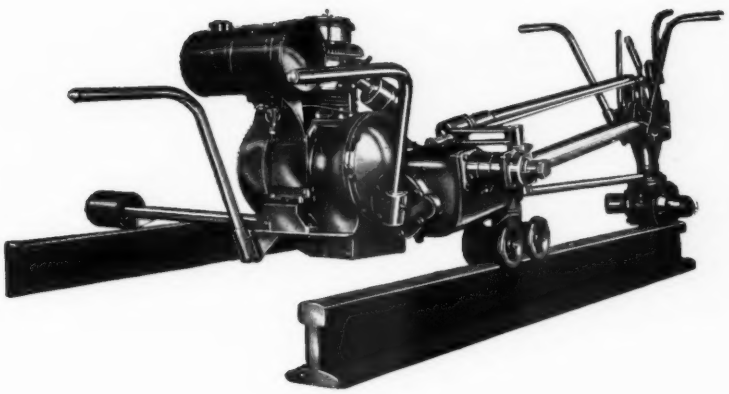
Sincerely,

Neal D. Howard
Editor

NDH:ag

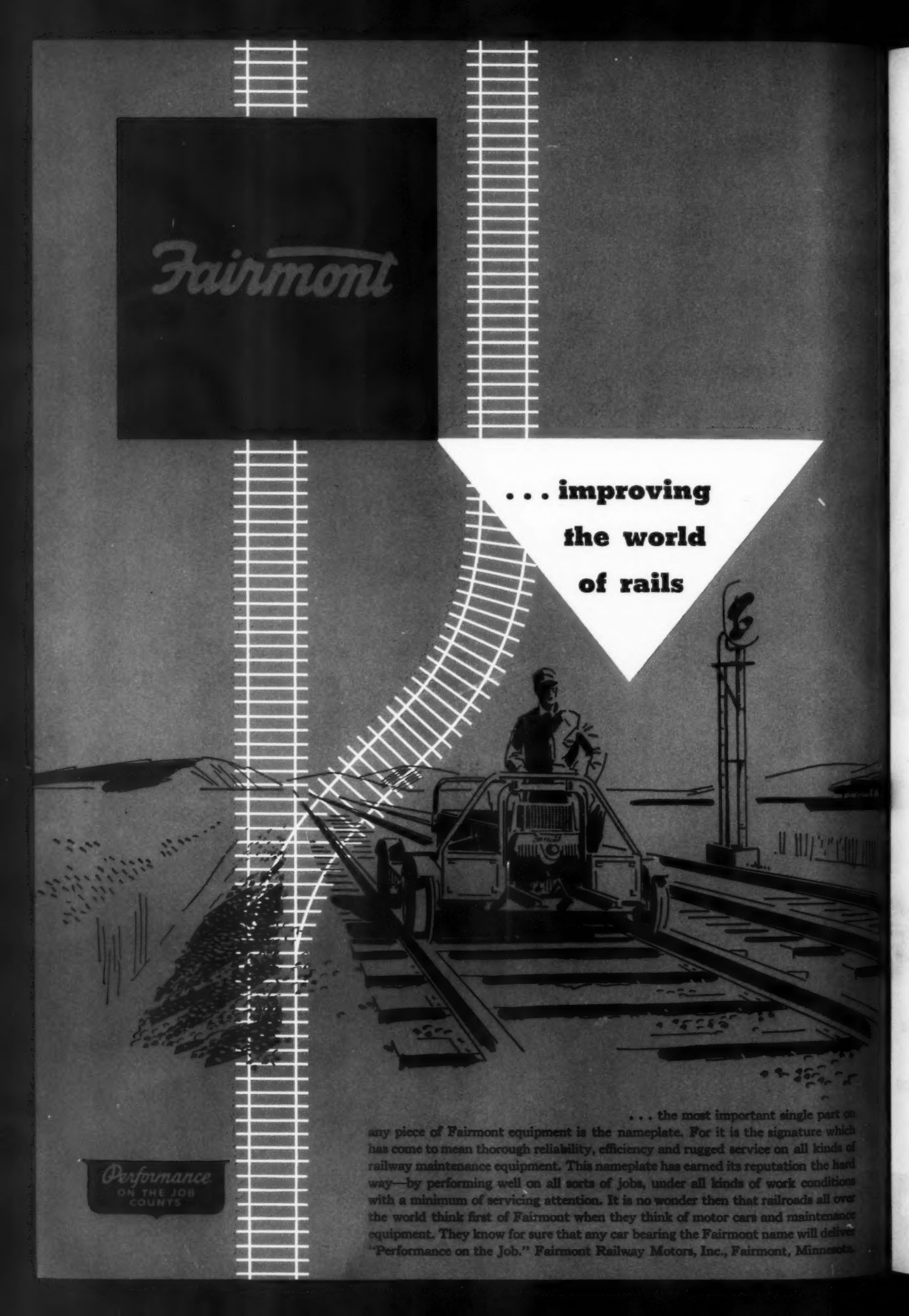
MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

40 Hour Week



"From a Supt. of M.W. Equipment on a big railroad."

FROM my study of the operation, no other machine used by the M.W. department gives us more saving for the cost involved than the Model "C" Raco Power Track Wrench.



. . . the most important single part on any piece of Fairmont equipment is the nameplate. For it is the signature which has come to mean thorough reliability, efficiency and rugged service on all kinds of railway maintenance equipment. This nameplate has earned its reputation the hard way—by performing well on all sorts of jobs, under all kinds of work conditions with a minimum of servicing attention. It is no wonder then that railroads all over the world think first of Fairmont when they think of motor cars and maintenance equipment. They know for sure that any car bearing the Fairmont name will deliver "Performance on the Job." Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Published on the first day of each month by the

SIMMONS-BOARDMAN PUBLISHING CORPORATION

79 West Monroe St., Chicago 3

•

NEW YORK 7,
30 Church Street

WASHINGTON, D.C., 4
1081 National Press Bldg.

CLEVELAND 13,
Terminal Tower

SEATTLE 1,
1914 Minors Ave.

LOS ANGELES 13,
816 West Fifth Ave.

DALLAS 4,
2909 Maple Ave.

•

Samuel O. Dunn, *Chairman of the Board;* James G. Lyne, *President;* S. Wayne Hickey, *Vice-President;* C. Miles Burpee, *Vice-President;* C. W. Merriken, Jr., *Vice-President;* H. H. Melville, *Vice-President;* F. C. Koch, *Vice-President;* Robert E. Thayer, *Vice-President;* H. E. McCandless, *Vice-President;* John R. Thompson, *Vice-President and Secretary;* John T. DeMott, *Treasurer.*

•

Subscription price in the United States and Possessions and Canada, 1 year $2, 2 years $3; other countries in Western Hemisphere, 1 year $5, 2 years $8; all other countries, 1 year $7, 2 years $12. Single copies, 50 cents each. Address H. E. McCandless, Circulation Manager, 30 Church Street, New York 7, N.Y.

Member of the Associated Business Papers (A.B.P.) and of the Audit Bureau of Circulations (A.B.C.), and is indexed by Engineering Index, Inc.

PRINTED IN U.S. A.

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

VOL. 45, NO. 10 OCTOBER, 1949

Editorials - 955

A Railroad Crisis—New Ideas—Supervision

Miniature Pile Drivers Pre-Determine Pile Lengths - - - - - - - 957

Describes a gasoline-powered unit used effectively by the Southern for investigating foundation and subgrade conditions

Another Speed Restriction Is Lifted - - - - - - - - - - - - 960

C. E. Sloan tells how the Baltimore & Ohio rehabilitated and strengthened a 12-span double-track viaduct at Johnsonburg, Pa.

Track Men "Talk Shop" at Chicago Meeting - - - - - - - - 963

A complete account of the Roadmasters' convention on September 12-14, including committee reports on the following subjects:

Developing Good Housekeeping Habits Among Track Employees

Stimulating Interest of Young Men in Maintenance-of-Way Work as a Career

Economies To Be Gained Through the Proper Distribution of Ballast

Preventing the Abuse of Tools and Work Equipment

The Relation of Supervision to Maximum Production of Track Gangs

Recent Developments in Transportation of Maintenance-of-Way Track Forces and Materials

What's the Answer? - - - - - - - - - - - - - - - - - - - 982

Using Power Chain Saws

Raising Track with Power Ballasters

Foundations for Small Buildings

Daylight Burning of Headlights

Using City Water for Locomotives

Installing Corrugated Roofing

Spraying Weed-Killing Chemicals

Products of Manufacturers - - - - - - - - - - - - - - - - 988

The Month's News - 996

MERWIN H. DICK
Managing Editor

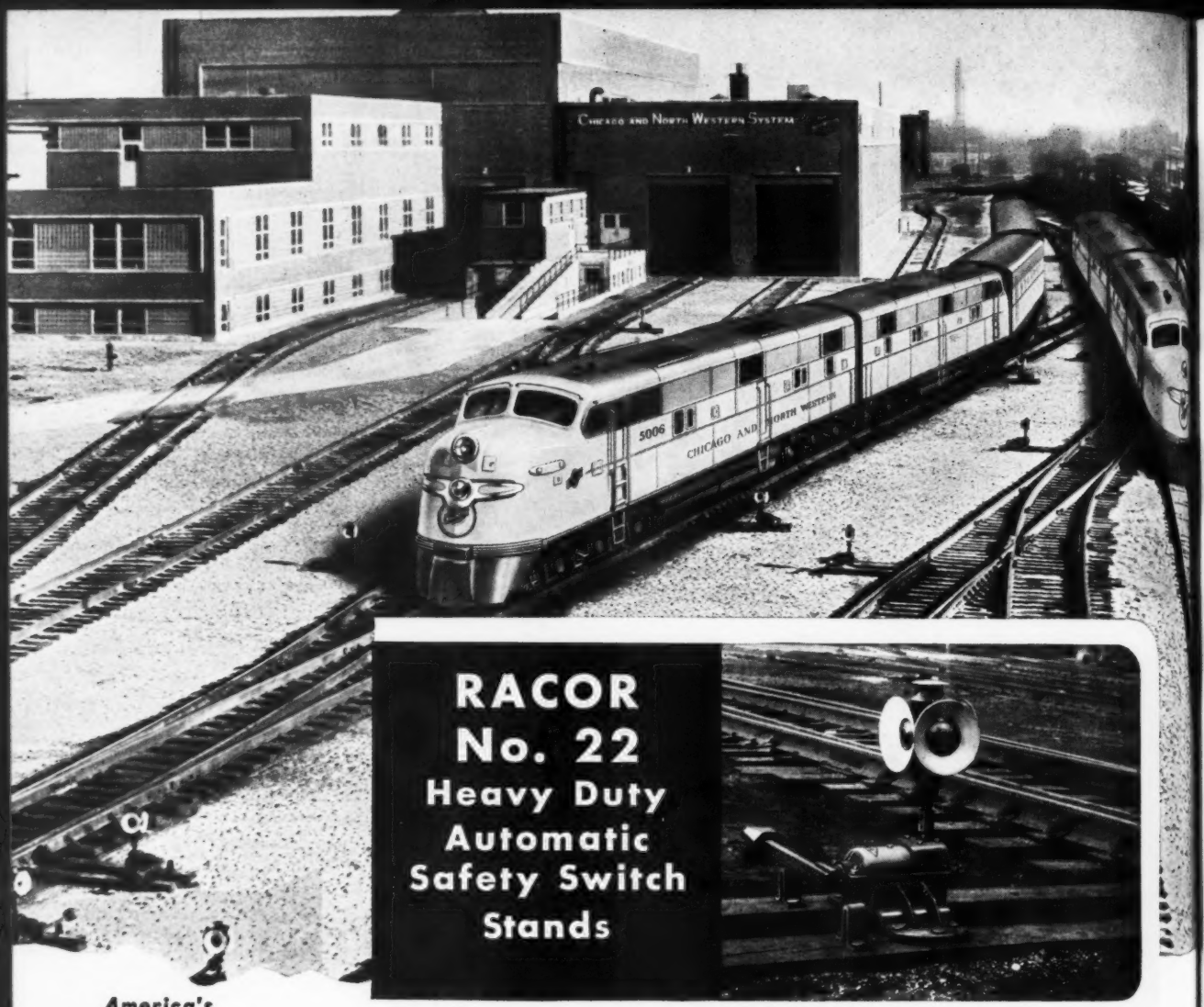
NEAL D. HOWARD
Editor

WALTER L. TURNER, JR.
Eastern Editor

HENRY E. MICHAEL
Associate Editor

JOHN R. THOMPSON
Business Manager

NORRIS V. ENGMAN
Associate Editor



RACOR No. 22 Heavy Duty Automatic Safety Switch Stands

America's most complete line of track specialties

AUTOMATIC SWITCH STANDS

VERTICAL SWITCH RODS

SAMSON SWITCH POINTS

SWITCH POINT LOCKS

RAIL LUBRICATORS

ADJUSTABLE RAIL BRACES

DEPTH HARDENED CROSSINGS

REVERSIBLE MANGANESE STEEL CROSSINGS

MANGANESE STEEL GUARD RAILS

RACOR

Provide safety and economy on the Chicago and North Western Railway

Racor No. 22 Heavy Duty Automatic Safety Adjustable Switch Stands have been installed with the track facilities serving the North Western's new Chicago Diesel Shop. Recommended for all busy switching turnouts that are frequently run through, these stands operate either manually or automatically. Adjustment to fit slight variations in the throw of switches is provided by a heavy 1¾" diameter adjustable crank eye. Target and lamp rotate with switches whether thrown manually or automatically. During automatic operation the hand lever remains stationary. Write for descriptive literature.

RAMAPO'S GREATER EXPERIENCE AND FACILITIES ARE READY TO SERVE YOU

AMERICAN Brake Shoe COMPANY

RAMAPO AJAX DIVISION
109 North Wabash Avenue, Chicago 2, Ill.

A Railroad Crisis—

What Are You, as Supervisory Officers, Doing About It?

The railway industry is in a fight for its life. Saddled with burdensome taxation and stringent regulation of its activities, and confronted with subsidized, little-regulated competition on waterways, highways, and in the air, the railroads literally have their backs to the wall. Indeed, they are fighting for their very existence as the cornerstone of the long-cherished, successfully-operated free-enterprise system of the country.

This is no idle scare comment. A recent issue of Fortune contained an article entitled "The Coming Crisis in Transportation," which pictured rail transportation as facing a threat that would eventually pull down into socialism every other basic industry of the country. Hundreds of other articles have pointed to the same thing—a crisis in railroading unless the roads are allowed to earn an adequate return; unless they are freed of antiquated regulation imposed years ago on the basis that they were a monopoly; and unless competing agencies of transportation are made to pay their own way without huge grants in one form or another from the public purse.

In the fight of the railroads to ward off a crisis, success in which can be had only by an enlightened public and public officials, where are the thousands of railway supervisory officers whose weight and influence could count for so much—who, along with everyone else employed by the railroads, have so much to gain?

Railway managements, both individually and collectively, are making a valiant effort to tell employees and the public of the unfair conditions under which the railways are being required to operate—conditions that presage their ruin unless corrected. Through the Association of American Railroads, public addresses, and countless articles and advertisements in the daily press, national publications and company magazines, they have told and continue to tell the story of the plight and needs of the railroads. But, again, where in this fight are the thousands of railway officers of supervisory rank—roadmasters, supervisors, division engineers, chief engineers, master mechanics, mechanical engineers, trainmasters, superintendents, and other such officers?

This question comes forcefully to mind at the close of a month in which several thousand such supervisory officers came together in annual conventions to consider and discuss their respective departmental problems—conventions which, admittedly, made important contributions to the technique of railway construction, maintenance and operation. As evidence of these contributions, witness the activities of the Roadmasters' and Maintenance of Way Association in convention in Chicago, September 12-14, as recorded in this issue.

But wherein did this organization, or any of the other railway officer groups meeting during the month, step out of its technical role for so much as a moment and say "Amen" in support of managements' fight in the climactic battle now being waged by the industry?

True, the Roadmasters' Association, meeting concurrently with the American Railway Bridge and Building Association, invited and welcomed as the key speaker at its opening session, J. H. Aydelott, vice-president, Operations and Maintenance department, A.A.R., who never fails to discuss the overall problems of the railroads and to urge the support of his listeners in the solution of these problems. On this particular occasion he again did just that—asked members of the association, in their contacts in their home communities, to state the case of

the railroads, and said that "the public and its representatives in Congress and in the State Legislatures should be told that whatever happens to the railroad industry to bring about its nationalization can happen to any of the free institutions of this country." At the close of his address, Mr. Aydelott received generous applause, indicating a full understanding and appreciation of his remarks. But was he assured the support he sought, and to which the cause he espoused entitled him? Were similar speakers at any of the other meetings of supervisory officers last month—upon urging attention to the overall problems of the railways—assured the kind of support—united support—that alone will be most effective?

Why should not these groups—as groups—rise up in resolution at their meetings and endorse the programs of their managements for relief from staggering taxation; for freedom from burdensome, stifling regulation; and for equitable treatment with competitive forms of public transportation? If they should do so, their voice would be heard from coast to coast, and in every legislative hall. Such action, coupled with the individual efforts of members of these groups to gain the support of other employees and the public in behalf of the railroads, could go far to turn a threatened railroad crisis into a future of railroad prosperity.

NEW IDEAS—

Must Be Actively Promoted

"THE OPERATION was a success but the patient died"—this cryptic expression is frequently used in instances where surgery is followed by the death of the patient. Somewhat paraphrased it can be adapted to describe a situation that seems to occur all too often in the railway maintenance field. Then it would be worded something like this: "The idea (or product) was a good one but it wasn't adopted."

How often does it happen in the railway maintenance field that a new idea, or method, or product, while acknowledged to have merit, is never put into use? Doubtless many maintenance men can recall instances in which new materials or devices have given highly satisfactory results when subjected to service tests, but which unaccountably disappeared from the picture thereafter or were never used to the extent that seemed justified by the results of the tests. They can also doubtless recall instances in which new ideas dealing with some aspect of railway maintenance were never adopted although they were acknowledged by all concerned to be superior to prevailing practice. A frequent complaint of manufacturers is that new products, promoted for use in the railway maintenance field, have frequently failed of adoption even though praised highly by some maintenance men.

Frequently the failure of a new idea or product to gain acceptance is not due to active opposition but to the lack of active support by anybody on the railroad. All that would be needed in most cases of this sort is for someone on the railroad, preferably of supervisory rank or higher, to take the initiative in campaigning for the new idea or product among his associates. In fact, to do so is a definite responsibility where there is evidence that effectiveness of the maintenance forces will thereby be enhanced.

Hardly any new development, regardless of its value, can be expected to sell itself. It must be "pushed" by someone who has a definite interest in seeing that it is adopted. And this interest need not necessarily be proprietory in nature. An intense desire to see that advantage is taken of every opportunity to do a better job should constitute all the incentive needed.

SUPERVISION—

Getting More Without Too Much

RECENT sharp increases in hourly wages, especially as a result of the 40-hr. week, have served to focus attention on the possibility of getting greater production per man-hour through closer supervision of maintenance gangs. The reasoning in some quarters is that closer supervision of work gangs, to be achieved at least partly through an increase in the number of supervisors, will result in a situation in which, with their activities more carefully planned and scheduled, track gangs will be able to devote a greater percentage of their time to essential work. In the words of one chief engineer, they would spend less time "riding up and down the track looking for something to do."

That the theory of greater productivity through closer supervision is considered sound by many maintenance men is indicated by the fact that some roads have taken steps to increase the number of track supervisory officers as part of their efforts to cope with the threatened rise in costs under the shorter work-week. Additional evidence of such thinking is contained in a committee report on the relation of supervision to the output of track gangs, which was presented before the Roadmasters' convention in September, and which is published in full elsewhere in this issue. In the opinion of the committee that prepared this report, "an effort should be made by the supervisor to keep all gangs lined up with work for several days ahead, so that in case some emergency arises which would keep him away for some days, the gang will have plenty to do."

However, in the discussion of the report quoted above a point was raised that is worthy of careful consideration on the part of all those who may be contemplating closer supervision of their section gangs. The point was that there can be such a thing as too much supervision and that when this happens the initiative of the foremen may be destroyed, placing him in a frame of mind in which he will be unable to make decisions based alone on his own judgment, or to proceed with any line of activity, even if obviously justified, unless told to do so.

The fact is that closer supervision need not necessarily mean over-supervision. Probably the secret in attaining an optimum situation in this respect is for the supervisor to make the foreman a party in planning the work of his gang, giving him all possible leeway in making decisions, while at the same time exercising the guidance required to produce the best results. The ideal relationship in this respect will require great tact and diplomacy, but the results will be worth the effort.

Miniature Pile Drivers Pre-Determine Pile Lengths

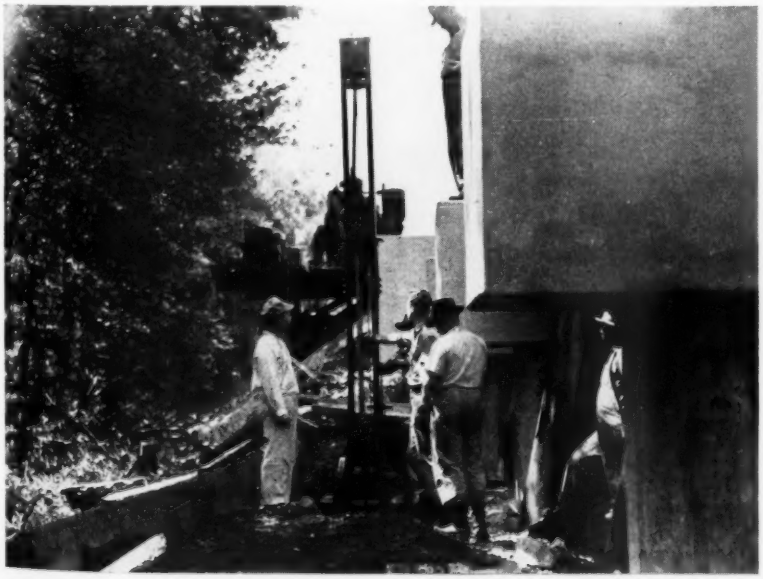
The Southern is now using three miniature pile drivers, which drive pointed steel rods, to determine foundation conditions in advance, as reckoned from the rate of driving or the depth of penetration of the rods. Use of this information enables accurate forecasting of proper lengths of piles to use, the bearing capacity of the piles for each foot of penetration, and the safe bearing load of the soil when designing mass foundations. The machines have also been used successfully in determining subgrade conditions in sliding fills.

• For the past year the Southern has been effecting substantial economy in the manufacture of pre-cast concrete piles for trestles as the result of the successful use of miniature, gasoline-powered pile-driving machines to determine in advance—through the use of pointed steel rods—the depths to which full-size piles should be driven, the location of rock below the ground, and other important foundation data.

Because of the nature of the country traversed by its lines, the Southern has a large number of open-deck timber trestles, aggregating many miles in length. In recent years it has undertaken a general program of replacing these structures with ballast-deck concrete trestles, founded on 24-in. octagonal-section reinforced concrete piles. With many thousands of these piles to be driven, it is readily evident that substantial waste of concrete would result if a high percentage of them proved to be of such length as to require the cutting-off of more than a reasonable amount in preparation for capping. Likewise, considerable expense would be incurred if many piles had to be built up in the field.

The miniature pile drivers used on the Southern are modeled after similar machines that have been used extensively by the Tennessee Valley Authority and are similar to an experimental machine which was described in Bulletin No. 90, published by the Engineering Experiment Station, Ohio State University, Columbus, Ohio, dated July, 1935.

Small size of the test pile driver facilitates its use in restricted places



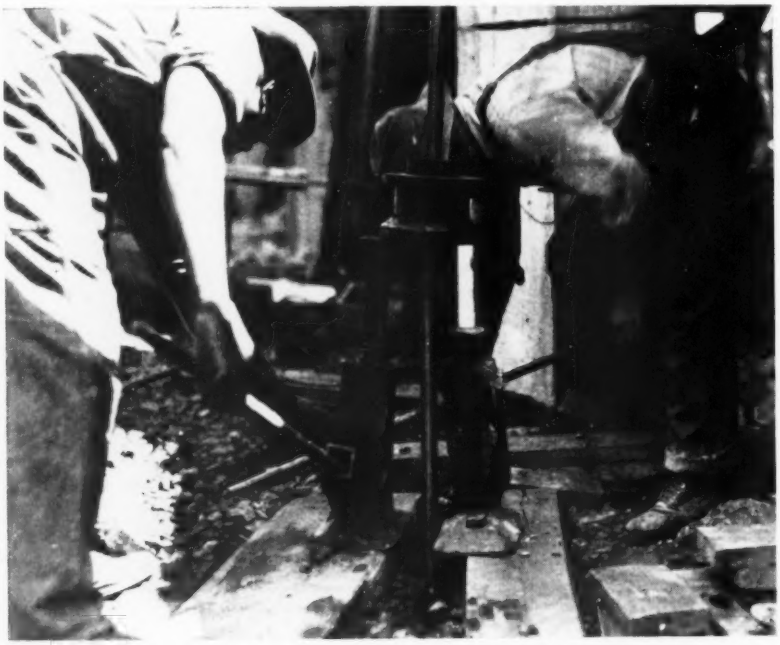
As the sounding rod is driven into the ground, measurements are made at one foot intervals to determine the penetration for three blows from a five-foot hammer drop

Machines Drive Steel Rods

The test-pile machines, of which three have been built by the Southern, drive a 1 5/16-in. steel rod (in reality a 1 5/16-in. steel tube with 0.562-in. inside diameter), tipped with a 1 5/16-in. forged steel point, and utilize a 122-lb. drop hammer as the driving force. By counting the number of blows per foot of penetration, it is possible, by comparison with similar tests or by correlation with the pile-driving records of full-size piles driven in similar soil, to determine the bearing capacity of piles for each foot of penetration.

The bulletin referred to gives formulas for computing the net energy output of the machine for a measured drop of the hammer and for evaluating the driving resistance

in pounds for a definite distance traveled by the driven rod. When these values have been determined, a graph, showing the relationship between penetration, in inches per blow, and resistance to driving, in thousands of pounds, can be prepared for use in determining the resistance value for each foot of depth of the driven rod. This information, when compared with records of driven test piles, affords the means of obtaining the proper design values to use in selecting the length of pile to use at the site being tested.



Above—The rod is pulled from the ground by means of a lifting collar and two Simplex track jacks. Below—The compact design of the driver is apparent in this view

Use in Sampling Soils

It is also possible to use the machines to drive a casing made of 1½-in. pipe, or to drive the pointed rod and the casing together. The casing, when driven alone, permits the sampling of a column section of the underlying soil. When the rod and casing are driven together, the rod is driven about a foot in advance. As the rod is free in the casing, the resistance to driving can be taken as a measure of the bearing capacity of the sub-soil at any elevation. When this type of exploration is made, it is the practice to take a column sample of the bearing to confirm the results.

In addition to the foregoing, the machines have been used to determine the depth of rock below ground level at the proposed locations of piers and abutments, thus enabling a close estimate of the quantity of excavation and of the concrete that will be required.

The small pile drivers are compact in design, their overall dimensions being 2 ft. 5 in. wide and 4 ft. 6 in. long. Except for the hammer leads, which rise to a height of 12 ft. 8 in., the machines are only 2 ft. 6 in. in overall height. Each machine embodies a 4-hp. Briggs & Stratton gasoline engine, a hoist, the hammer leads, made of steel angles, and the hammer assembly, all mounted on a steel framework arranged to ride on a pair of retractable pneumatic-tired wheels.

Power Transmission Described

Power from the engine is transmitted through two flexible connections and a reduction gear to a friction spur, located adjacent to the drive pulley of the hoist. A fixed brake shoe is mounted on the opposite side of the hoist from the friction spur and the entire hoist assembly is eccentrically mounted on the frame so that the drive pulley can be made to bear against the friction spur, against the brake shoe, or be independent of both, as activated by a shift bar. A length of light cable passes from the drum of the hoist, through a sheave at the top of the leads, and is attached to an eye-bolt in the driving hammer.

Raising the Hammer

When it is desired to raise the hammer, the control bar is moved toward the rear to cause the drive pulley of the hoist to bear against the friction spur. Release of this pressure frees the hammer to drop. To hold the hammer in the raised position, the operator moves the control toward the front, through a short arc, causing the pulley to bear against

the brake shoe. A rapid hammer action is achieved by alternately bringing the pulley to bear against the spur and releasing it, thus raising the hammer and allowing it to fall.

Testing Rods

The rods used for depth soundings work are 1-5/16 in. in diameter and are fabricated in four-foot lengths from heavy seamless tubing having 0.562-in. inside diameter. Each section is threaded to receive a short steel stud for use in adding other sections as penetration increases. The studs are also pinned to the rods as a precaution against their becoming unscrewed during the driving process. The driving points, 1-5/16 in. in diameter and 8 in. long, are fabricated of forged steel and are threaded at one end so as to be screwed into the lower end of the rod.

The casing for taking column samples of soil, as when determining the bearing power of piles, is made of four-foot lengths of 1½-in., extra-strong black-iron pipe, joined together by threaded couplings.

The hammer assembly consists of the hammer itself, a follow block and a driving head. The hammer is of cast steel, slotted to ride in the leads, and is machined to an exact weight of 122 lb. The follow block is of forged steel and also rides in the leads. The lower surface of the follow block is concave, being shaped to fit exactly over the top of the driving head, which is in the form of a segment of a sphere. The lower end of the driving head is threaded to receive a stud which, in turn, is screwed to the top sounding-rod section. When driving the 1½-in. pipe casing, an adaptor is used with the driving head.

Pulling the Rods

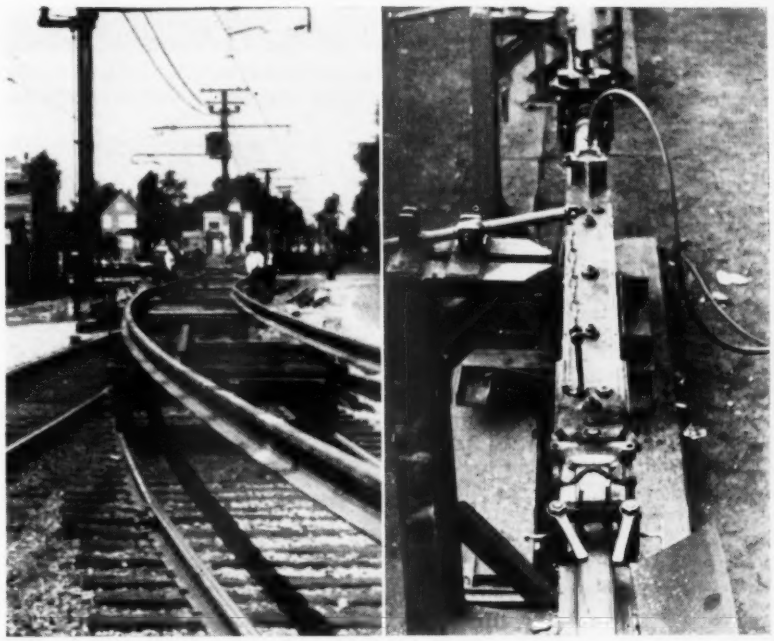
When the driving operation has been completed, the rods are pulled from the ground by means of a lifting collar and two Simplex jacks. The lifting collar is of cast steel, eight inches in outside diameter, with a conical hole bored through the center. The collar is slipped over the section of rod protruding above the ground, with the smaller opening of the conical hole down. Four serrated and tapered jaws are then inserted into the hole in the collar and arranged around the rod. Upward pressure by the jacks on the lower face of the collar crowds the jaws against the rod with great force, thus transmitting the jacking load to the rod, which is raised as the lifting action continues. When the jacks reach their limit of travel, they are released, also releasing the crowding pressure of the jaws. The entire collar assembly is then slipped down on the rod to a new pulling position, and the jacking repeated.

Testing Sliding Fills

In addition to extensive use in foundation work, these machines have also been used to explore the sub-surface conditions in sliding fills. In such work the casing is driven one foot into the ground, after which the driving rod, with a special sampling tube attached to its lower end, is driven to a depth one foot below the casing. The rod and tube are then removed to recover the sample and are then lowered to the bottom of the hole, being careful not to disturb any of the material below. Then, the casing is driven until its lower end is at the same elevation as the lower end of the sampling tube and the entire operation is repeated until rock is encountered.

By plotting the nature of the samples, a complete and accurate picture of the material in the sub-grade may be obtained. This can then be used as a guide in determining the stabilization measures to use in correcting the trouble.

Operation of the test pile drivers on the Southern is carried out under the general direction of J. B. Akers, chief engineer, G. L. Sitton, assistant chief engineer, and W. H. Barnard, Jr., bridge engineer, Washington, D.C. We are indebted to E. S. Birkenwald, engineer of bridges, Western Lines, Cincinnati, Ohio, for much of the information contained in this article.



WELDED RAIL FOR I.C. SUBURBAN TRACKS—This month the Illinois Central will complete the installation of 1,000 tons (about three double-track miles) of new 90-lb. continuous welded rail in the main tracks of its South Chicago branch between 67th street and 80th place, Chicago—the first continuous rail to be laid in Chicago commuter territory.

In the picture at the left is shown a string of push cars loaded with two long rails, being pulled out of the 83rd street suburban yard, where an Oxweld production line has been set up. The push cars are en route to the relay territory. The welded rails for this job were fabricated in lengths (maximum about 600 ft.) equal to the distances between street crossings—through which new welded rail had been previously installed. Closure at these points is being made by field welds.

At the right is shown an innovation in the Oxweld assembly line, which was used for the first time on this project. It is a device for planing off the upset metal from the top and sides of the rail head at the welded joint. The upset metal was formerly burned off by torch. The knives of the plane cut the metal much closer to the contour of the rail head than was possible when the torch was used. Consequently a considerable reduction is effected in the amount of grinding required, and costs are reduced accordingly.

As part of its general program to strengthen over-stressed bridge structures and thus permit the removal of speed restrictions, or to gain the advantages offered by heavier power, the Baltimore & Ohio has recently rehabilitated a double-track viaduct and bridge at Johnsonburg, Pa., on its important line between Pittsburgh and Buffalo, N.Y. In this article, the road's engineer of bridges describes the structure and tells of the strengthening measures that were taken.

Strengthening the deck-truss river spans of the Baltimore & Ohio's Johnsonburg bridge was accomplished by erecting a new truss between each pair of old trusses

ANOTHER Speed Restriction

By C. E. SLOAN
Engineer of Bridges, Baltimore & Ohio
Baltimore, Md.

• For the past nine years the Baltimore & Ohio has had under way a program for the strengthening of over-stressed bridges on its lines to eliminate speed restrictions or to gain the advantage of operating heavier power. One of the more recent steps in this program was carried out at our double-track viaduct and bridge over the Clarion river at Johnsonburg, Pa., on the line from Pittsburgh, Pa., to Buffalo and Rochester, N.Y., which was recently repaired and strengthened to permit the removal of a troublesome speed restriction, affecting the heavy freight engines of the B. & O. and, also those of the Erie, which has trackage rights over part of the line in this territory.

This line—originally known as the Buffalo, Rochester & Pittsburgh—was opened to traffic in 1883. The viaduct at Johnsonburg—the second to be built at this point—was completed in 1902.

Has Twelve Spans

This structure is comprised of twelve spans, numbered from the east. Spans 1 to 10, inclusive, crossing over low ground on the east side of the river, form two independent steel viaducts—one for each track—with a total length of 448 ft. 9 in., and are supported on 40 steel columns. Spans 1 to 6, with a total length of 282 ft. 9 in., are on a 5-deg. curve, while the remaining four spans are on tangent. Span 11, crossing the Clarion river, consists of two independent single-track deck truss spans 128 ft. long, while Span 12, which crosses some tracks on the Pennsylvania on the west side of the river, is a through-girder structure, 107 ft. long, and is fairly modern construction, having been rebuilt in 1918. The combined length of the two-track viaduct, the deck truss span and the double-track through-girder span is 687 ft.

The bridge department of the B.&O. assigns a rating to each class of locomotive, and, correspondingly, to the bridges over which the engines operate, the rating being based on the Cooper system of engine loadings in general use, the factor being 4.5. The B. & O. ratings are given in multiples of 10. The following table shows the comparison between these ratings and Cooper's loadings.

B.&O. Rating	Cooper Loading
220	E-48.9
280	E-62.2
310	E-68.9

Spans 1 to 11, inclusive, were designed for a loading which should have permitted unrestricted operation of engines having an assigned rating of 280. Accordingly, B.R.&P. locomotives having this rating were permitted to operate in the Johnsonburg territory.

When the B.&O. took over the B.R.&P. in 1932, the capacity of the bridge was recalculated in conformity with the more exacting rating rules of that date, taking also into account some deterioration of the members. It was found that the columns of the viaduct portion and the trusses of the river span had an actual rating of only 220 or E—48.9. Therefore, while locomotives with ratings in excess of this value were allowed to continue operation over this structure, they were subjected to a severe speed restriction over the bridge.

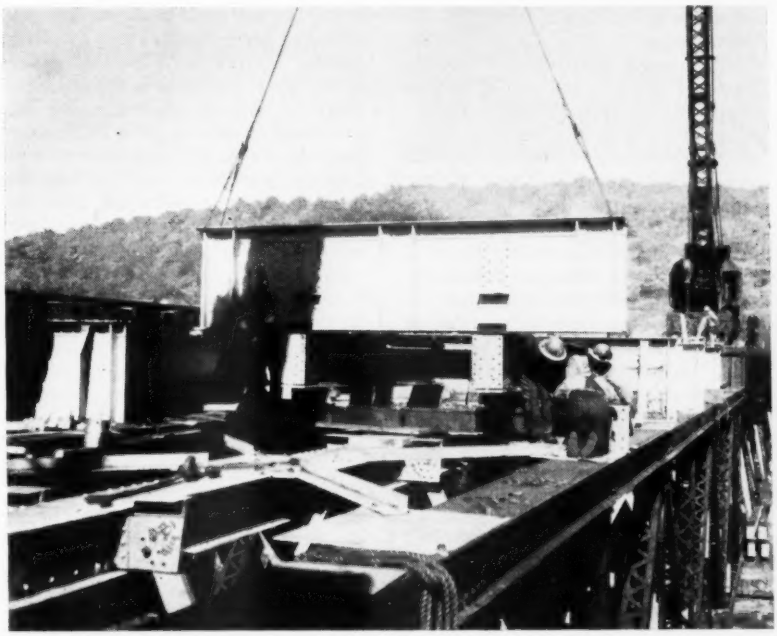
Dangers of Over-Stress

When a bridge is over-stressed for a long period of time, it usually deteriorates rapidly. Progressive failure of parts is likely to occur, particularly where good practice

The columns of the viaduct structure were strengthened by arc-welding ordinary carbon-steel plates to the column web plates

The additional trusses in the double river span were assembled in place, being temporarily supported from the existing trusses

ls Lifted



Work on the river span was progressed from both directions. Here the erecting gang working from the east end places a new floorbeam in the span for the eastward track

may not have been followed in the design or fabrication of these parts. To minimize the bad effects of continued over-stress, it is the usual practice to resort to speed restrictions for those engines which produce the over-stress. The reduced speed decreases the effect of impact —the dynamic forces caused by the unbalanced weights on the drivers of steam locomotives, the side sway and nosing action of moving equipment, and the effects caused by rail joints and other irregularities in the track.

More Effective Solution

A speed restriction on main-line track is very difficult to enforce and a more effective solution would be to prohibit the operation of excess-weight locomotives over the bridge involved. The latter course cannot always be followed, in which case the bridge should be renewed or strengthened as soon as it is economically feasible to do so. During the past nine years, our management has provided the necessary funds to permit the removal of 54 speed restrictions which were placed in effect because of over-stressing of bridges.

Fortunately, the weaknesses in the viaduct and river spans of the Johnsonburg bridge were of such nature as to permit strengthening instead of rebuilding. To rebuild this entire structure for modern loading would have cost more than $500,000. The cost of the strengthening and repairs was about one-fourth that amount. Of course, the saving cannot all be considered as gain, as there remains a light structure, with a considerable part of its service life used up. Nevertheless, the advantages gained were substantial.

As mentioned, the two viaducts are supported on 40 built-up steel columns. Of these, 36 supporting

The river span as it appeared on the second day of work on westward track. Only five days were required to complete the work and restore this track to service

adjacent ends of two spans, were found to be overstressed and to require strengthening. This strengthening, for the most part, was confined to the web plates of the column members. Strengthening was accomplished by arc-welding ordinary carbon steel plates, of almost the full column length, to these web plates. The new reinforcing plates were tapered at each end, the purpose of the taper being to increase the column section gradually, and secure as favorable distribution of stresses as possible. Great care was used in welding to insure satisfactory results, because it was feared that faulty work might result in locked-up stresses which could further weaken the columns, rather than strengthen them. Four welders were used on this phase of the work, which was done under traffic and required slightly more than five weeks.

Added New Trusses

The strengthening of Span 11, the double, deck-truss span crossing the river, was a more difficult problem. Plans were made for a new truss to be erected midway between each pair of the two older trusses supporting the tracks. It was found that the most economical and safe method of erection was to take one track out of service at a time and remove the deck, the floor system and the lateral bracing from one pair of the existing trusses. Then the new truss could be erected between the old trusses, being supported by them during erection. Field-connection holes had to be made in the old steelwork to accommodate the new lateral bracing between the old trusses and the new. This plan required single-track operation, first over the eastward track, and then over the westward, under an arrangement worked out with the operating department.

Fabrication and Erection

The steel work for strengthening the trusses was fabricated by the Fort Pitt Bridge Works, Pittsburgh, while the erection of the material was done by the American Bridge Company, also of Pittsburgh. Work on this phase of the erection began on September 20, 1948, and was completed on November 4, using two heavy-duty erecting cranes.

Prior to the erection work, a siding for storing the cranes, and a temporary crossover between the main tracks, directly east of the bridge, were constructed by railroad forces. The new crossover, together with an existing crossover west of the bridge, made it possible to handle traffic over the eastward track while carrying out the work on the westward track.

When the westbound track was cut, work was then carried on continuously as expeditiously as possible on the westbound truss span. As the new steel members were assembled they were bolted in place temporarily, the bolts being replaced with rivets later. Nearly 10,000 rivets were driven in each half of the span. Traffic was restored over the westbound track five days after it had been taken out of service.

Completed Ahead of Schedule

Meanwhile, the track forces had installed another temporary crossover west of the bridge and, after the first detour operation was concluded, these men removed the temporary crossover east of the bridge and placed it in reverse position so that traffic could be detoured over the westward track. Immediately, following a plan similar to that employed on the westward truss span, work was carried out on the eastward truss span and traffic was restored over this span in five days. The time for erecting the new truss in each of the two spans crossing the river had been estimated at seven to ten days.

While the westward track was out of service, as a repair measure only, track forces replaced all of the timber deck on the westward truss span, as well as that on the viaduct and on the span over the Pennsylvania, thus making effective use of the detour period to accomplish needed maintenance.

The project was carried out under the general direction of A. C. Clarke, chief engineer of the B.&O., Baltimore, Md. Plans were prepared in the office of the writer, while the field work was under the supervision of E. F. Wright, regional engineer, Pittsburgh, with J. E. Graham, assistant engineer, in direct charge. Because of certain technical aspects of the work, A. J. Wegmann, chief bridge inspector, Baltimore, was at the site most of the time.

Slow Order Removed

As a result of this work the slow order, which had been in effect for at least 17 years, has been removed. The rating of the line now is increased from 220 to 310, this value being determined by the viaduct girders, which were not strengthened, these having a greater capacity than other parts of the structure. The removal of the slow order represents a major operating advantage on the important line between Pittsburgh, Buffalo and Rochester, and particularly on the double-track portion of this line in the vicinity of Johnsonburg, where traffic, both B. & O. and foreign, is heaviest.

Roadmasters' Section

Track Men "Talk Shop" at Chicago Meeting

Committee reports and addresses furnished much food for thought at well-attended three-day convention of Roadmasters' group at Chicago. Forty-Hour week was among matters discussed.

President Fox at the speaker's rostrum

• Fortunate indeed were those track-maintenance officers who attended the annual meeting of the Roadmasters' and Maintenance of Way Association at the Stevens hotel, Chicago, September 12-14, where they were presented with a large amount of new information of great value to them in their daily work. In a well-rounded program of technical committee reports and addresses much was said on the 40-hr. week, on how to protect tools and equipment from abuse, on the relation of supervision to the output of track gangs, on getting young men interested in maintenance work, on the distribution of ballast, on promoting good housekeeping habits, and on new developments in transporting men and materials. And, as an "extra dividend," there was all the information that exchanged hands during the discussion periods following the reading of the reports and during informal conversations in the corridors and elsewhere.

B. & B. Meeting Also Held

Continuing an arrangement that is now generally accepted as standard practice, this meeting was held concurrently with the annual convention of the American Railway Bridge & Building Association. Missing this year was the usual exhibit of manufacturers' products that is normally staged during these combined meetings by the Track Supply Association and the Bridge & Building Supply Men's Association. However, these two groups were hosts to the members of the two railroad associations and their families at a banquet held on Tuesday evening, which was attended by 1,000 persons. Also, the two supply groups collaborated in arranging to display in the corridor of the convention floor at the hotel the pictorial exhibit of progress in railroad engineering and maintenance, which was presented originally at the Golden Anniversary convention of the American Railway Engineering Association last March. This display was loaned for use during the September meetings by the National Railway Appliances Association.

In view of the absence of a products exhibit, the substantial nature of the attendance at the combined meetings was a subject of considerable comment. A total of 808 members and guests registered. While this figure is somewhat less than the record registration of 900 members and guests at the 1948 meetings, it is considerably in excess of the totals for 1947 and 1946, which were 765 and 693, respectively.

The highlights of the roadmaster's sessions, and of various joint activities of the two groups, are given in this article. The November issue will contain an account of the activities of the Bridge & Building Association.

The two conventions were convened at a joint opening session on Monday morning. Presiding jointly over this session were R. L. Fox, division engineer, Southern, and president of the Roadmasters' group, and E. H. Barnhart, division engineer, Baltimore & Ohio, and president of the Bridge & Building Association. All separate sessions of the Roadmasters' meetings were directed by Mr. Fox, assisted by A. G. Reese, district engineer maintenance of way, Chicago, Burlington & Quincy, and second vice-president of the association.

Scene at the registration desk on Monday morning. The total registration was 808

Those present at the joint opening session first heard words of greeting from Kenneth Cavins, as president of the Track Supply Association, from G. R. Betts, as president of the Bridge & Building Supply Men's Association, and from Lewis Thomas, as secretary of the Track Supply Association. The principal address at the opening session was presented by J. H. Aydelott, vice-president, Operations and Maintenance department, Association of American Railroads.

Following the opening session the two groups separated to begin their individual meetings. In his opening address before the Roadmasters' group, Mr. Fox pointed out that, with a membership of 1,027, this association is no longer a small organization and that no one challenges its place in the railroad field. Yes, he said, if the members wish to live up to what is expected of them by their management, they must work with "untiring efforts" toward the betterment of maintenance and the improvement of service. Mr. Fox expressed the opinion that the association is now ready to take on more responsibility, and to carry out this thought he recommended that 10 subjects be selected for study by committees, instead of the usual six, and that the additional four reports be published in railway publications in advance of the convention each year.

Mr. Fox called attention to the "serious shortage of young men with high school and college degrees applying for jobs in the maintenance departments of our roads." He attributed this situation, "in a minor degree," to the failure of supervisors to contribute to their development and to "our failure to encourage these young men to seek our employment." Mr. Fox expressed the opinion that the training and developing of young men to become future foremen is one of the most challenging problems facing the association today.

The separate sessions of the roadmasters' meeting were devoted for the most part to the presentation and consideration of six committee reports on the following subjects: Stimulating Interest of Young Men in Maintenance-of-Way Work as a Career; Economies To Be Gained Through the Proper Distribution of Ballast; Relation of Supervision to Maximum Production of Track Gangs; Preventing the Abuse of Tools and Work Equipment; Developing Good Housekeeping Habits Among Track Employees; and Recent Developments in Transportation of Maintenance-of-Way Track Forces and Materials.

In addition to the committee reports the roadmasters' program included an address by G. L. Morrison, assistant engineer maintenance of way and structures, Southern Pacific, who spoke on Railroading on the Pacific Coast. A number of addresses were presented during the joint sessions. On Tuesday morning F. S. Schwinn, president of the A.R.E.A., and assistant chief engineer, Missouri Pacific Lines in Texas and Louisiana, spoke on Maintaining the Railroads in 40 Hours. On Tuesday afternoon C. J. Geyer, vice-president, construction and maintenance, Chesapeake & Ohio, addressed the combined groups on the subject, What Now? You Can Help, and C. M. Kimball, assistant to vice-president, safety, Southern System, spoke on Personalizing the Safety Concept. Other features of the Tuesday afternoon session were three sound motion pictures, one of which, in color, was entitled Use and Abuse of Track Motor Cars, and was presented through the courtesy of the Illinois Central. The second, depicting methods of handling ties mechanically, was exhibited through the courtesy of Stemm Bros., Inc., Leavenworth, Wash. The third picture dealt with the erection of the

Roadmasters' Association

Officers, 1948-49

R. L. Fox, president, division engineer, Sou., Alexandria, Va.

Neal D. Howard, first vice-president, editor, *Railway Engineering and Maintenance*, Chicago.

A. G. Reese, second vice-president, district maintenance engineer, C. B. & Q., Galesburg, Ill.

E. E. Crowley, treasurer, roadmaster, D. & H., Albany, N.Y.

Elise LaChance, secretary, Chicago.

Directors

C. Halverson, division roadmaster, G.N., Willmar, Minn.

J. E. Fanning, assistant to chief engineer, I.C., Chicago.

R. H. Gilkey, division engineer, Cent. of Ga., Savannah, Ga.

H. C. Koch, roadmaster, C. & W.I., Chicago.

F. G. Campbell, chief engineer, E.J. & E., Joliet, Ill.

G. L. Morrison, assistant engineer maintenance of way and structures, S.P., San Francisco, Cal.

H. W. Kellogg, division engineer, C. & O. (P.M. dist.), Detroit, Mich.

A. H. Whisler, assistant engineer, P.R.R., Philadelphia, Pa.

Neal D. Howard
First Vice-President

A. G. Reese
Second Vice-President

E. E. Crowley
Treasurer

several notable bridges constructed on the Redding-Delta line change of the Southern Pacific a few years ago.

On Wednesday afternoon, following the close of the business session, nearly 200 of those in attendance participated in a conducted tour of the manufacturing plant of the Pettibone-Mulliken Corporation at Chicago, where they saw various steps in the manufacture of special trackwork and an exhibit of material-handling machines.

Election of Officers

In the election of officers, held at the closing session on Wednesday, Mr. Reese was advanced from second vice-president to president (Neal D. Howard, first vice-president, and editor of *Railway Engineering and Maintenance*, having requested that he be relieved of further official duties in the association); Cornell Halverson, division roadmaster, Great Northern, Willmar, Minn., was advanced from director to first vice-president; A. H. Whisler, assistant engineer, Pennsylvania, Philadelphia, Pa., was advanced from director to second vice-president; and E. E. Crowley, roadmaster, Delaware & Hudson, Albany, N.Y., was re-elected treasurer. Directors elected were O. H. Carpenter, general roadmaster, Union Pacific, Pocatello, Idaho, who fills the unexpired term of Mr. Whisler; R. G. Simmons, assistant to engineer maintenance of way, Chicago, Milwaukee, St. Paul & Pacific, Chicago; and W. M. S. Dunn, general roadmaster, New York, Chicago & St. Louis, Bellevue, Ohio.

Subjects for Next Year

Six subjects were chosen for investigation by committees during the ensuing year. These are as follows: (1) Desirable Revision in the Organization of Track-Maintenance Forces Made Necessary Under Present-Day Working Conditions; (2) Methods of Organizing, Equipping and Operating Rail-Renewal Forces; (3) Construction and Maintenance of Highway Grade Crossings; (4) Power Tamping Equipment and its Effectiveness; (5) Various Methods of Ballast Cleaning and Renewal; and (6) Improved Methods Used in Surfacing and Raising Tracks to Grade and Line Stakes. It is contemplated that, as recommended by Mr. Fox, four additional subjects will be chosen at a later date.

Following are abstracts of the addresses by Messrs. Aydelott, Schwinn, Geyer, Kimball and Morrison. Also, the six committee reports are presented in full.

C. J. Geyer addressed combined groups on subject, What Now? You Can Help

On Tuesday morning F. S. Schwinn spoke on Maintaining the Railroads in 40 Hours

Convention Pictures

On these and following pages are presented photographs snapped in the Stevens hotel during the Roadmasters' and Bridge & Building conventions. Additional pictures taken during the meetings will appear in the November issue in connection with a detailed report of the Bridge & Building sessions.

MUST TELL THE PUBLIC

In his opening address before the joint opening session on Monday, Mr. Aydelott discussed the overall problems of the railroads in dealing with rising costs and in competing with subsidized forms of transportation. Since "so much has been said in the past about the railroads being over-capitalized and over-burdened with debt," Mr. Aydelott pointed out that the financial structure of the railroads has been "vastly improved" since the pre-war years, indicating, he said, that sound managerial policies exist in the railway field.

Mr. Aydelott asked his listeners, in their contacts in home communities to state the case of the railroads, pointing out their accomplishments and the extent to which they contribute to the welfare of the people in the communities served. With forces in this country promoting policies, the adoption of which would eventually destroy the railroads as free institutions, Mr. Aydelott said that the public and its representatives in Congress, and in the state legislatures, should be told that whatever happens to the railroad industry to bring about its nationalization can happen to any of the free institutions in this country, "whether they be in the field of industry, mining, merchandising or farming." He said that the acceptance of subsidies from the federal government is an invitation to government direction and that the long-range effect of subsidies is to pauperize all forms of transportation.

MUST OBSERVE RESULTS

Supervision can help in the solution of the railroads' problems if it will take note of the conditions under which work is done and "through the months and years couple the results up with the execution of the job and see if you can figure out better planning," said Mr. Geyer, in his address before the joint session on Tuesday afternoon. The contribution that the two associations have made to the railroad industry, said Mr. Geyer, has been made possible through the efforts of those members who, inbued with a desire to do a good job at low cost, have noted the results of their daily work and, at the annual meetings, "have told others what they have accomplished and listened to the accomplishments of others."

Mr. Geyer drew an analogy between farming and railroad maintenance, and said that the successful farmer or maintenance officer, in the event of a failure, will not be satisfied with the first excuse that comes in mind, "but will review the case history with the intent of finding the real cause of failure and of doing everything in his power to avoid premature failures, extend life cycles, and thereby reduce annual costs." If maintenance policies and plans are well conceived, maintenance officers of supervisory rank, instead of "working on a crisis basis," will become real supervisors instead of mere "trouble shooters."

Mr. Geyer expressed the belief that it is practical and economical to

The convention offered many attractions for the women too. Shown here are the wives of some of the men from the Southern and one from the Missouri Pacific. They are (left to right) the Mesdames J. R. Goodman; J. S. Wearn; A. R. Bookout; R. L. Fox; T. M. von Sprecken; J. E. Griffith; E. M. Dougherty; E. L. Denman (M.P.)

smooth out maintenance work over the years to avoid either heavy or light expenditures in any one year. This policy, he declared, will prolong the life cycle of materials, will permit work to be planned in an orderly manner, and will bring about desirable labor relations because of greater regularity of work. The end result, he said, will be lower maintenance costs and a better and more uniform maintenance condition.

In Mr. Geyer's opinion the 40-hr. week presents no new problem—"it is simply another high cost obstacle that must be overcome." He told his listeners that "you have done an excellent job in overcoming these cost obstacles in the past and you can whip this one if you will review your planning, dust off your old economy studies, and don't forget to look for new ones."

THE CAREFUL SURVIVE

"A railroad section is just as dangerous as the foreman permits it to be, and just as safe as management *wants it to be*," stated Mr. Kimball in his address before the joint session on Tuesday afternoon on Personalizing the Safety Concept.

Just as military leaders ride at the front of their columns to obtain an overall strategic concept of conditions, Mr. Kimball said that the leaders on the railroads must place themselves at the forefront, holding Safety First above everything else so that the employees may live in health and happiness. While nature's law is "survival of the fittest," Mr. Kimball said that today's law is "survival of the careful," and we must progress with this in mind.

In concluding his address, Mr. Kimball said that "one of the blessings of today is that not a section laborer or carpenter can be killed without the president of his road knowing about it." He stated that the responsibility for the safe operation of our mechanized appliances and equipment, as well as the safety of the workmen, rests upon the shoulders of the supervisor.

THE 40-HR. WEEK

Maintaining the railroads in 40 hr. a week is not a problem, but a job that must be done— a job of planning, study and work—said Mr. Schwinn in his address before the joint session on Tuesday morning. Railroad men have all the answers required in performing this job, according to Mr. Schwinn; all that they have to do now is to apply them properly.

As the basis for this viewpoint Mr. Schwinn drew an analogy between the present situation involved in reducing the work-week for non-operating employees from 48 to 40 hr. and that which confronted the railroads in 1918 when the work-week was reduced from 60 to 48 hr. Rather than the number of maintenance-of-way employees being increased as a result of that earlier development, Mr. Schwinn pointed out that there was a gradual decrease, which amounted to 35 per cent 30 years later. This decrease occurred, he said, in spite of an increase of 70 per cent in the amount of freight traffic carried, and an increase of 40 per cent in train speeds.

This showing was made possible, said the speaker, because of better and more permanent bridges and track, the development of new organizational methods for the employment and distribution of manpower, long strides in the mechanization of maintenance work, the development of means for stabilizing the roadbed, and the general adoption of the creosoted tie. Pointing out how these same expedients can be of help in the present situation, Mr. Schwinn said that "quite likely we can go much further in the performance of work by machines rather than by hand," that there will be other machines developed to perform work which we are still doing by hand, that "we can do very much more" in the stabilization of the roadbed and track, that there are good prospects of securing even greater life from crossties, and that "the use of longer rails with resulting large economies is definitely in the picture of the future."

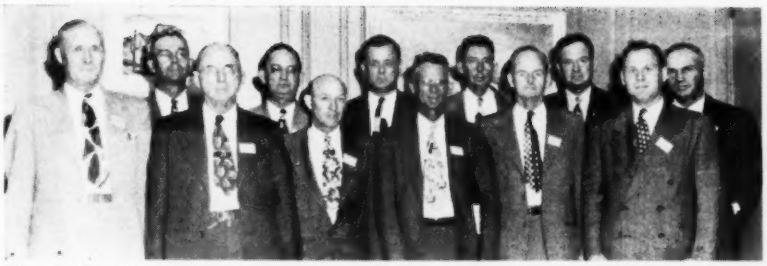
Saying that railroading under the free enterprise system is founded on economics, and economics supply the urge for most railway activities, Mr. Schwinn added that maintenance men are "facing another economic necessity today." To substantiate this statement he recited figures showing how increased costs and taxes have affected railway earnings. As a consequence, he stated, the economic necessity for reducing costs is actually greater today than it was in 1918. "There is the incentive," he said, "which will cause history to repeat itself."

Mr. Schwinn's address was followed by a roundtable discussion of the 40-hr. week in maintenance work, in which the speakers consisted of C. M. Chumley, engineer maintenance of way, Illinois Central, Chicago; G. L. Sitton, assistant chief engineer, Southern System, Washington, D.C.; and A. A. Cross, engineer maintenance of way, New York, New Haven & Hartford, New Haven, Conn. Explaining that, with few exceptions, all maintenance forces on his road were working a straight five-day week, Monday through Friday, Mr. Chumley said that the short week had been in effect two week ends, one of them containing the Labor Day holiday, and that no difficulty had been experienced. The objective on his road, he said, is to accomplish as much work in 40 hr. as was done in 48 hr., without increasing the number of men. This would be made possible through greater efficiency, he said.

A question raised by Mr. Sitton was whether, under present practices, the railroads would get 40 hr. of constructive work out of their maintenance forces, or something less than this figure. The roads must decide, he said, whether section foremen are to continue to patrol their sections, pointing out that little progress has been made in relieving them of this responsibility. By closer supervision and other measures, he added, the maintenance forces must be left free to devote all of their available working time to constructive work.

Mr. Cross said that the roads must depend on their supervisory officers

in making the 40-hr. week work, and that for this reason such officers must be relieved as much as possible of all extraneous duties. The progress that has been made in mechanization has placed the roads today in a better position to solve the problems facing them than prevailed in 1918, in the opinion of Mr. Cross. A responsibility of maintenance men, he said, is to recognize the need for new and improved equipment and to cooperate with manufacturers in developing it. On the New Haven, said Mr. Cross, the maintenance forces are working a straight five-day week, except that at 14 locations, including large terminals, the gangs may be worked on a staggered basis between November 1 and April 1, so that men will be on duty on Saturdays to handle emergencies. Similar arrangements can be negotiated at other locations, if necessary, he said.



The Seaboard Air Line was well represented at the meetings. In this group (left to right) are: J. L. Gibbs, rdm.; L. F. Barrs, rdm.; R. O. Zittrouer, mast. carp.; J. V. Inabinet, gen. br. insp.; E. M. Hutto, rdm.; L. E. Conners, supvr. wk. equip.; R. L. Collum, mast. carp.; K. L. Diamond, rdm.; J. D. Coe, gen. rdm.; L. E. Hardin, rdm.; T. B. Hutcheson, asst. ch. engr.; L. G. Sharpe, rdm.

WEST COAST RAILROADING

Problems of railroad construction and maintenance peculiar to the West Coast were the subject of the address by Mr. Morrison on Wednesday morning. He pointed out that all the western states are traversed by numerous mountain ranges with intervening valleys and plateaus, and that the western railroads are "faced with a never-ending series of ups and downs . . ." Illustrative of this condition, he said, is the fact that the Southern Pacific Company traverses territory with a range of elevation from 200 ft. below sea level to 6,900 ft. above.

Mr. Morrison then described the principal physical characteristics of the various lines of the Southern Pacific, explaining the nature of the country traversed, the range of grades and curvature, and special maintenance problems encountered. Some of these problems include the prevalence of slides in the Cascade mountains, the hazard of fire on a line where the embankments are built of material dredged from the bottom of a lake, the maintenance of 6.13 mi. of snowsheds on the line over the Sierra Nevada mountains, the necessity of coping with snowfalls in these mountains that have amounted to as much as 677 in. in a single winter, the maintenance of 11.8 mi. of timber trestle across Great Salt Lake, severe subsidence on a stretch of track that is carried on an embankment across a tidewater slough with 80 ft. of mud over the original sand bottom, sudden cloudbursts in desert country, and the lack of water for locomotives in arid regions.

Developing Good Housekeeping Habits Among Track Employees

Report of Committee*

• Housekeeping as defined by Webster is "the management or control of household affairs." Applied to railroads, it could be further defined as the economical management of properties by the planned use of men, monies and materials to insure full value for every dollar expended.

Now it is natural to ask the following questions: What is good housekeeping? Why have good housekeeping? When should it be practiced? What relationship does good housekeeping have to good track? What effect does it have on the morale of our customers—our employees? Finally, how can it be developed?

C. E. Neal
Chairman

The Tool House

The first step in the day's work begins at the tool house. Management should provide adequate tool houses, where tools can be kept in their proper places, in bins and racks, so they are readily available and so every man in the gang will know their location. Motor cars and push cars must be kept clean, properly lubricated, and so maintained as to prevent the possibility of breakdowns. This applies also to power tools, especially those which are interchanged with other sections. All machines should be kept clean and in good working condition, and operators should be given time to see that this is done. Here substantial returns are received from the practice of good housekeeping, for a clean machine can be easily and quickly inspected and small defects found and corrected before they cause serious damage. These are tangible results of good housekeeping that can be calculated in terms of real money.

To cut down the possibility of fires at tool houses, underground gasoline storage tanks equipped with suction, or force, pumps are usually provided. This should be a requirement on all railroads. Oil drums are usually placed on racks, and under them a drip pan, filled with sand, is located so as to catch drippings. Safety cans for filling motor cars with gasoline are a must. All of these things should be provided by our railroads. It is up to us as supervisors to see that they are used and that tool houses are kept clean, neat and in an orderly manner. This is not a task to be given to one man once a week, but must be handled daily, with all mem-

*Chairman of this committee was C. E. Neal, general track supervisor, Southern Pacific, San Francisco, Cal.; vice-chairmen were T. P. O'Keefe, assistant division engineer, Northwestern Pacific, San Rafael, Cal., and J. D. Henley, track supervision, Charlotte, N.C.

Shown here are some of the officers of the Track Supply Association and the Bridge and Building Supply Men's Association. They are (left to right) Lewis Thomas, sec., Track Supply Assn. (Q & C Co.); Kenneth Cavins, pres., Track Supply Assn. (Fairmont Railway Motors, Inc.); G. R. Betts, pres., Bridge and Building Supply Men's Assn. (Armco Drainage & Metal Products, Inc.)

bers of the gang participating in the work.

Materials at section headquarters should be piled neatly, with the small material in proper bins. A material platform made of concrete, asphalt pavement, or secondhand stringers or ties, is necessary to provide a proper bearing for the larger items. If the materials for a platform are not available a leveled-off spot covered with gravel, screenings or cinders will suffice. With such a platform the foreman has the opportunity to get his material together, thus eliminating the possibility of it's becoming lost or misplaced. Materials that are so placed can be readily inventoried and over-supplies can be quickly detected. With the high cost of materials today, stocks must necessarily be kept to the minimum, and there is no better way to do this than to keep the materials at designated locations.

Standards Vary

The standard of housekeeping necessarily varies with the degree of importance of the track. What might be considered as acceptable on a light-traffic branch line would not be tolerated on a high-speed main line. General rules are applicable to all locations, but it is up to the supervisor to see that his gangs are not spending time and money unnecessarily. Each spot must be judged on its own merits. A job on the track, whether it be main line or branch, is not complete until the ties, scrap and other material are picked up, ballast is replaced in the track, and the last small detail taken care of.

How much better a job is when the small details are attended to, and a few minutes are devoted each day to cleaning up, than when old ties and released materials are left scattered around for someone to fall over, ballast is not replaced in the cribs, and tools are left out over night. Leave a sloppy job and it is likely to remain sloppy. As a result, criticism is invited. A job that looks good will usually be a good job, for if the men take enough pride in their work to see that the track is cleaned up, they will also take pride in the quality of their work, seeing that all details, no matter how small, are attended to. The final result is good track.

Why have good housekeeping? This probably can be answered best by saying that with it you have safety first. Without it you have a condition which can only result in personal injuries, fire losses, and an indifferent attitude on the part of employees toward their work. With good housekeeping comes good track, which, after all, is the one thing we are all striving for.

Materials that are allowed to lay around constitute a very definite hazard to trainmen, as well as to our own men. Materials which are improperly piled and cared for result in many personal injuries. The number of personal injuries sustained by railroad men falling over material, scrap and rocks in toe paths and runways, and because of uneven ground conditions, is astounding. Such injuries are particularly prevalent in heavy-switching yards, where yardmen are constantly getting on and off moving engines and cars. The railroads are spending huge sums of money daily to overcome poor footing conditions, and it is known to all of us that where these conditions are corrected, the accident ratio for this type of injury drops very rapidly.

This all leads back to the trackmen. If good housekeeping habits are developed by them, these conditions can be materially improved. Yards must, of course, be given special attention. Where necessary, machines, such as end-loaders, power shovels, cranes and trucks should be used to assist yard cleaners in keeping walkways and toe paths clean.

Weed Control

With the increased cost of labor, the pulling and cutting of weeds by hand must, of necessity, be kept to the absolute minimum. The use of chemicals for the treatment of the roadbed is expanding, and proper machines, such as weed mowers, weed burners, flame throwers, kerosene torches and butane torches, should be used wherever possible. If these tools and chemicals are to be used efficiently, a program must be set up and careful study made so as to minimize the use of hand labor.

The removal of weeds and grasses is important not only from the standpoint of making good-appearing track and of reducing fire hazards, but, most important of all, to improve drainage. We maintenance men know that the provision and maintenance of good drainage in roadbeds is of the utmost importance to good, safe track. Savings made by good drainage can be computed in dollars and cents. Fires which originate along the track as a result of dry grass, with possible large losses to railroad and adjoining property, quickly reflect the importance of a well devised plan for weed control. Weeds in the ballast are a thorn in the side of the track man, and he will utilize every means available to remove them, for he is well aware of the fact that it costs more to maintain track which is fouled with weeds.

An Every-Day Job

There is no "closed season" on good housekeeping. It is a duty to be performed, and, with repetition, good housekeeping habits become a part of the daily routine, not only on the job, but personally as well. Some foremen set apart one day for clean up; others use parts of certain days. We know that the best results are obtained when good housekeeping is practiced daily. A good housekeeper does not clean up once in awhile. He stays at this job, keeping on top of all conditions which tend to give his railroad a ragged appearance.

Good housekeeping and good track go together. It is difficult to draw the line between them. However, if good housekeeping is carried to the point where a gang becomes more interested in maintaining a good ballast line than good track line, in keeping a uniform ballast section instead of uniform surface, in picking weeds out of the ballast rather than picking up low joints, then it becomes a wasteful practice and false economy.

Housekeeping must be kept in balance and not carried to extremes. Neatness is essential to good work, and is the outward sign of a straight-thinking mind. One who practices neatness in his work and about his person will naturally turn out good work. He will see that all of the small details of a given job are completed in a workmanlike manner, for he will not be satisfied with anything but the best.

Effect On Patrons

The effect that a properly maintained railroad has on our customers is important. Given a choice of two roads, assuming, of course, that each could and would handle his business in about the same time, it is natural to believe that the shipper will pick the one which looks the best—the neatest—for he can be sure that this road will make the best effort toward giving him the service that he wants, and that his goods or products will arrive in the best condition.

Our patrons on the passenger trains are quick to comment on the good housekeeping of our properties—or lack of it—so we should all endeavor to keep them looking in the best possible condition. The morale of employees on a well-maintained railroad is always higher than that of employees on a road that looks on good housekeeping with indifference. They take pride in working for such a company, and their safety habits are at a higher level. Thus, the danger of personal injuries is lessened, better work is done, and increased production is accepted as the ordinary thing.

The development of good housekeeping habits must begin with the man who does the work—the trackman. Each man has his own idea of what constitutes good housekeeping. Therefore, the foreman nec-

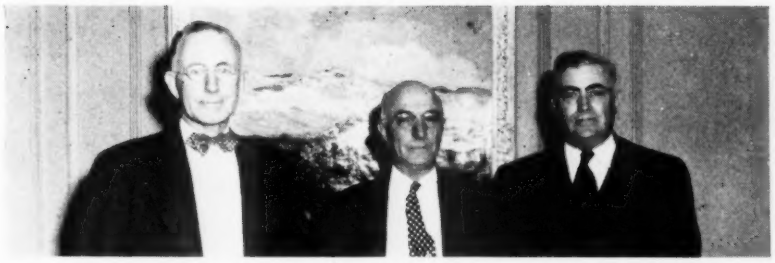
essarily becomes the teacher, so that all of his men will be thinking and acting along the same line, to the end that he will have a uniform condition, and not six or eight conditions—all different. The foreman must see that his men understand just what is wanted and why. By taking his men into his confidence and explaining the whys and wherefores of good housekeeping, he will give them a feeling that they are a part of the great team that keeps the wheels rolling.

Roadmasters and supervisors have a very definite responsibility in maintaining good housekeeping, for it is the rule, rather than the exception, that the appearance of their districts will quickly reflect their interest in this matter. They must set a goal and see that every man under their supervision becomes familiar with that goal and works toward it.

Management, too, must want good housekeeping before the idea can ever be sold to the employee. Many ideas are used to encourage good housekeeping, such as annual inspections, awards for best sections, medals or scrolls, etc., for neatness. These are all very helpful. But probably the best, and incidentally the cheapest, encouragement is a word or a letter from a supervisor or other officer complimenting a man upon his efforts, the appearance of his section or district, or even singling out one particular job for praise. Roadmasters, supervisors and foremen can gain much by riding over other districts. Actually seeing what the other fellow is doing will create much interest, and develop in men the desire to better their own sections. Management should encourage this practice, which will develop the competitive spirit in the organization and tend to bring about uniformly better conditions.

The conclusion to be drawn from the foregoing facts is that good housekeeping habits are essential to efficient railroad operation and maintenance. The extent to which these habits should be developed depends entirely upon their economic value to each railroad. Extremes in either direction are equally wasteful, and can neither be warranted nor condoned.

The maintenance departments of all railroads are now faced with the 40-hr. week, which is reducing the working time 16⅔ per cent. With time and effort being so reduced, it is incumbent upon all of us to evaluate to a greater extent than ever before the benefits to be derived from good housekeeping habits.



Three representatives of the New York Central. They are (left to right): E. H. McGovern, dist. engr.; L. B. Elliot, asst. dist. engr.; J. L. Cox, div. engr.

Discussion

In the absence of the chairman this report was read by T. P. O'Keefe (N. W.P.), a vice-chairman of the committee. A brief discussion followed in which two major points were emphasized. First, it was pointed out that good housekeeping is essentially a matter of taking care of things easily and quickly while they are small—before they reach major proportions and require more time and effort. Secondly, emphasis was placed by W. J. Jones (S.P.) on the fact that, in the track department, good housekeeping begins at the toolhouse. He said this was aptly demonstrated in one of the scenes in the safety film shown by the Illinois Central, which prominently displayed a large placard entitled "Good Housekeeping" in the door of a toolhouse that was "as neat as a pin."

Stimulating Interest of Young Men in Maintenance-of-Way Work as a Career

Report of Committee*

• The most valuable asset the railroad industry has is its employees. To stimulate the interest of young men in maintenance-of-way work as a career, it is imperative that this fact be recognized and that sympathetic and active programs be set up by the industry, whereby this interest can be stimulated. This is not only a job for direct supervision, but for management as well. It is well to remember that the results to be obtained by stimulating this interest depend entirely upon the efforts put forth by the individual railroad.

W. M. S. Dunn
Chairman

Objections to Railroad Work

An effort to stimulate a young man's interest in railroad maintenance-of-way work as a career might well begin by considering some of the reasons why many young men today are not interested in maintenance work. The most frequent objections to and criticisms of railroad maintenance engineering as a career, voiced by students and prospective employees, and heard time after time, are:

(A) The Railroad Industry Itself Has No Future—This attitude results in part from the publicity given newly developing types of transportation, and, in part, from inadequate publicity efforts on the part of the railroads.

(B) Job Insecurity—The tendency of some railroads to lay off their young employees and trainees whenever business falls off a little. This has raised doubt as to the reasonable security offered by railroad work.

(C) No Chance For Promotion—The seniority angle is most frequently voiced in this connection. Railroads on which seniority does not apply to trainees should stress this factor. Others might try to free themselves of this problem, perhaps by setting up a department in which the new men can be advanced while training for supervisory positions, without a slavish adherence to seniority.

Another angle to the same objection is voiced in the often repeated phrase, "I am afraid I will get stuck in a drafting room for the next 10 or 15 years." Enough cases

*Chairman of this committee was W. M. S. Dunn, general roadmaster, New York, Chicago & St. Louis, Bellevue, Ohio; vice-chairmen were N. W. Kopp, assistant engineer design, Illinois Central, Chicago and C. G. Grove, chief engineer maintenance of way, Western region, Pennsylvania, Chicago.

Shown here (left to right) are T. H. Beebe, ch. drafts., C. & N. W.; S. H. Shepley, asst. ch. engr., E. J. & E.; F. G. Campbell, ch. engr., E. J. & E.; F. W. Hillman, asst. engr. maint., C. & N. W. (retired)

of this type can be cited to prove such fears are justified. In this connection, too, is the belief among many young college men that their training will be wasted if they work on a railroad. On some railroads this would undoubtedly be true. Too few railroads have a definite program of training and advancement.

(D) Too Little Knowledge of the Job—Many young employees in the maintenance-of-way Department want a job where they can "get out and build something." They look upon maintenance work as dull and uninteresting. An effort on the part of all concerned to point out the interesting features of the job, the challenge, yes, and the glamour of maintenance work, particularly when emergencies arise, will help to dispel the idea that only construction or building work is interesting. The hard, exhausting side of the job should not be glossed over. Young men with the right qualities will find these difficult features more of a challenge than an obstacle.

(E) Insufficient Salary—Efforts of the American Railway Engineering Association have brought some favorable changes in this situation. Nevertheless, many railroads are not alive to the situation. Too many railroad officers are thinking in terms of "when I went to work for $60 a month." The fact has not been overlooked by some prospective employees that even after several advancements the men in equivalent jobs in other industries will still be earning a higher rate of income. Railroads often excuse this low pay scale on the basis of job security. This might be all right if the alleged security actually exists. It often does not. There are many other industries which offer as much security at higher rates of pay. Contractors, whose work is notoriously seasonable (and well paid), keep their best men under pay even when not actually at work.

(F) Conditions of Work—Because of housing difficulties, the requirement that new employees (and older ones too) move at frequent intervals does not appeal. Many of the better young men today are returned G.I.s who have had enough wandering, are married, and want to settle down. This presents a difficult problem for everyone. Perhaps a beginning could be made by publicizing a program to hold, when possible, for the newly transferred man the quarters vacated by the man he is replacing.

Poor environment has also been cited. The expression "dirty railroad town" has crept into these discussions. Perhaps the railroad, which is always a power in a community, should become more civic minded.

Finally, many prospective trainees are faced with what they consider misleading or humiliating titles. Draftsman, chainman, rodman, or even instrumentman have little meaning to outsiders and usually bear little relation to the work the man is actually doing. Engineering assistant or junior engineer are among titles that are more descriptive and flattering to the trainee's ego.

Overcoming Objections

In addition to the suggestions already given, a program to meet these objections might include some of the following:

(1) Securing the Young Man's Interest in Railroad Work as a Career.

(a) Newspaper and magazine articles, stories, and pictures.

(b) Sending speakers to schools and universities.

(c) Furnishing moving pictures of railroad work and operations to schools and universities.

(d) Have the Association of American Railroads work with the moving picture industry to produce movies featuring railroads and railroad men.

(e) Arrange inspection tours for schools and university groups.

(f) Provide summer employment for students.

(g) Assist in providing better study materials in schools.

(2) Make a Positive Effort to Secure Good Men.

(a) Follow up the publicity suggested above by active solicitation at the school before graduation.

(b) Let the solicitor be fully prepared to discuss his railroad's policy towards new employees and details of the job.

(c) Be reasonably prompt in making the prospect a definite offer, or in telling him if an offer will not be made.

(d) Do not send the prospect long distances for additional interviews if the possibility of his securing a job is not almost assured.

(3) Prepare a Program of Pay, Training, Advancement, and Security.

(a) The solicitation of Point 2 is wasted if the solicitor has no adequate program to present. The new employee will soon become disgusted and discouraged if the promised program fails to materialize.

(b) Pay wages and make salary scales a little higher than the prevailing rate. Maintenance work requires the best talent available.

(c) Keep trainees as free of seniority restrictions as possible. To make them junior supervisory officers or to place them in an exempted group may help.

(d) Prepare an adequate training program (a study in itself), using classes, moving pictures, inspection trips, and frequent changes of location and promotions as part of the training. The choice of the superiors under whom the new men first work is important. Give trainees some responsibility as quickly as consistent with their experiences.

(e) Do not hire any more men than can be absorbed by the industry. This will promote job security.

(4) Make Working Conditions as Attractive as Possible.

(a) First, and most important of all, select the right man. This man must have an inherent desire to make railroad work his career.

(b) Inform him before employment of any unpleasant features of his job.

(c) If he must be on call, let it be with authority and purpose, not just a traditional formality.

(d) Adopt some program, preferably informal, to aid employees in finding quarters when they are moved.

(e) Again, give hime some early responsibility. Make him feel that he is a necessary part of his organization.

The proper selection of the trainee, plus some advertising, no doubt is the best solution to all of these problems. The man in whom has been awakened a real interest and enthusiasm for his job will not find some of the other factors so objectionable. On the other hand, tradition is no excuse for continuing any unpleasant features of employment which can be reasonably improved.

Practical Men

To continue an intelligent discussion of this assignment, it is necessary to divide the men who make maintenance-of-way work their career into two rather distant groups. We will consider as in the first group young men who enter the service with a common high school education, and who are usually referred to as practical men. These men might be hired as trackmen, carpenter helpers, welder helpers, signal helpers, chainmen, axemen, etc. The second group to be considered are technically-trained men who have had college or university training and are engineering graduates, and who usually enter the maintenance-of-way department as junior or assistant engineers, rodmen, etc.

In regard to the men in Group 1, (practical men) there is definitely a very critical need for men in the maintenance-of-way department who are capable of becoming supervisors. The man who prepares himself to become a satisfactory foreman or supervisor is, in our opinion, preparing himself for a career just as much as the technically-trained man is in his work. The older, experienced foreman is fast disappearing due to approaching retirement age. There are far too few younger men in the maintenance-of-way department qualified to take their places.

There is always present the pressure of higher wages outside the railroad industry

to contend with, especially in the highly industrialized sections of the country. To rise from a trackman in a gang to the position of foreman or supervisor can very well be a long, drawn-out process and very disheartening. Seniority prevails in the maintenance-of-way department in most cases. The policy of some railroads is such that there are seasonal lay-offs in the maintenance-of-way department. Many well-qualified men, who are potential material for supervisory positions, are laid off when these reductions are made due to their lower seniority or roster standing. This is one reason why it is becoming increasingly difficult to get young men with fair educational background to start in at the bottom with the idea of working up to the position of foreman or supervisor.

Special Training

This committee believes it would be worthwhile for railroad managements to work with labor organizations, with the view of reaching some agreement whereby a percentage of outstanding men in sections and gangs could be kept on a separate roster for special training. To negotiate such an agreement would, no doubt, require some effort on the part of management and concessions on the part of organizations. But the effort required to reach the agreement is, in our opinion, necessary, as we can see no other way whereby the railroads can be assured of an adequate source of foreman material. These men could be put on the roster as student foremen or gang leaders, under experienced foremen, and thus get the necessary practical training for promotion.

The history of the American railroad bears ample proof of the fact that, time after time, men who started at the bottom of the ladder, with little or no technical training, have attained top positions in management. To attract more men into maintenance-of-way work who have the necessary native ability, ambition, and energy requires the combined efforts of supervision and management. Men coming up from the ranks must have the same opportunity to advance to higher positions that is given the trained man. Increase the dignity and importance of supervisors, foremen, inspectors, and other secondary officers.

College-Trained Men

To interest the technically-trained man in maintenance-of-way work as a career, it is imperative that the railroad industry make definite contacts with the sources of supply. Furthermore, if college students are interested in railroad work, or if it is possible to create such an interest in them, it is necessary that the industry present some well formulated plan so the students can intelligently weigh the advantages and disadvantages of a railroad career.

In interviewing the prospective employee, the following four fundamental characteristics should be considered by the management, viz., intelligence, leadership, personality, and character.

When a young man has been employed, keen interest must be taken in his progress, and every help given him to avoid discouragment. The beginner should be strongly encouraged to do his own thinking and to use his own ingenuity. As a man progresses in training, he should be promoted to duties commensurate with his ability or qualifications. Great care must be taken to avoid promotion too quickly, as such a course would seriously handicap the future of the individual. On the other hand, perhaps greater care should be taken to see that the man is promoted at the proper time, as we know of nothing more tragic or conducive to loss of interest than to hold a qualified man on a job far below his ability. The new young employee should be told of the hardships and problems of the maintenance-of-way department on the modern railroad. It should be impressed upon him that there is not too much glamour attached to the work. Likewise, that there must be a real willingness on his part for hard work, the assuming of responsibility, and the exercising of sound judgment.

In this group from the west (left to right) are: J. R. Kanan, asst. engr. trk., C. & S.; R. C. Williams, rdm., Ft. W. & D. C.; W. C. Oest, prin. asst. engr., Ft. W. & D. C.; R. E. Noonan, rdm., Burl.-R.I.

Knowledge of Organization

A good basic knowledge of the organization of the maintenance-of-way department is imperative. This will be of great benefit to the beginner in his future choice of work. This basic knowledge is gained by personal or technical training, or natural aptitude, and should determine which department will be best suited for the particular individual.

In placing the new man with his teacher or trainer, much thought should be given to the type of man with whom the beginner starts his training. There should be patience and due consideration for lack of experience on the part of the trainee, and proper respect for the trainor on the part of the beginner. Of course, ideal conditions are seldom possible, but much can be accomplished in this respect with some practical planning.

Men so placed are just as much an investment on the part of the railroad company as an expensive piece of machinery. A machine is given every advantage possible and used under the best working conditions. A young man endowed with intelligence and a will to work also represents a big investment and is entitled to at least equal consideration.

Such a program is entirely possible, and we believe very practical. Once started, it must not be allowed to fail. It is the responsibility of the railroad company to make the program a success. It must be, if the railroad is to maintain a good reputation with the technically-trained men. Otherwise, no good material will be attracted, and the whole system will fail due to the lask of a source of supply.

Many Questions Raised

To the young man choosing the career in which he plans to devote his life's work, a number of questions might well arise, such as, (1) Are the working conditions safe? Do you have an active safety program? (2) Are there opportunities of advancement? (3) Does the job permit the use of individual initiative? (4) Is efficiency recognized by salary adjustments? (5) Do salary scales compare favorably with those in other activities? (6) Does the position afford security in periods of depression? (7) Is adequate provision made for retirement?

Answers to the above questions cannot always be made in the affirmative. If they could, it would be a determining factor in interesting young men in maintenance-of-way work as a career.

The same young man would undoubtedly ask these questions: (1) Does the principle of seniority prevent rapid advancement? (2) Are excessive limits placed on the initiative of subordinates by higher authority? (3) Does the position carry a fixed rate remuneration, regardless of the manner in which the job is performed? (4) Are salary scales lower in the maintenance-of-way department than those of comparable positions in other departments on the railroad?

If a careful study of personnel policies currently in effect on your railroad indicates that the answers to these questions are in the affirmative, it would be well to recommend that these policies be revised. By so doing, a long step forward will have been taken toward stimulating the interest of young men contemplating careers in maintenance-of-way work.

The committee is of the opinion that the execution of some of the various thoughts and ideas expressed in this report will be of assistance to the railroad industry in securing the services of intelligent, ambitious, progressive, and loyal young men in maintenance-of-way work on the railroads.

The conclusions of the committee are obvious. The securing and developing of young men in maintenance-of-way work is imperative. The acceptance and execution of some such plan as outlined is entirely a question of policy on the part of manage-

This group includes only part of the large attendance from the Chesapeake & Ohio. A picture of another C. & O. group is shown in the September 24 issue of Railway Age. In the photograph above are (left to right): J. C. Runyan, supvr. trk.; V. A. Scobie, supvr. trk.; E. A. Gustafson, supvr. trk.; H. W. Kellogg, div. engr.; P. D. Haines, b. & b. supvr.; H. S. Smith, supvr. trk.; B. E. Hayes, supvr. rd. mach. & equip.; J. H. Peterson, supvr. trk.; R. J. Diener, gen. supvr. trk.; C. W. Butcher, supvr. trk.; P. R. Mathews, asst. div. engr.; R L. Hecker, asst. b. & b. and w.s. supvr.; B. J. Howay, b. & b. supvr.

ment. If undertaken, it should be pursued intelligently and vigorously.

Discussion

G. L. Sitton (Sou.) opened the discussion by pointing out that the wage increases of recent years had been in terms of cents per hour, with each increase narrowing the differential between the pay of a trackman and a foreman until now the difference in rate is so little that some trackmen are refusing to assume greater responsibilities.

In concurring with this view, E. E. Crowley (D.&H.) stated that he had recently had several good men refuse to bid on advertised jobs because the pay did not warrant their becoming foremen. He also stated that the critical need for men capable of becoming supervisors could be reduced if the recommendations of the committee were followed, especially as regards seeking the cooperation of labor organizations in reaching an agreement by which a percentage of outstanding men could be placed on a separate roster for special training.

E. M. Dougherty (Sou.) expressed the belief that more college men could be interested in railroad careers if the railroads would take an active interest in student chapters of the American Society of Civil Engineers. He stated that participation by railroads in the programs of any of these chapters would heighten the interest of students and faculty in the engineering and maintenance work of the railroads and would help to influence students in their choice of careers.

H. W. Kellogg (C.&O.) reported that there was evidence in the Detroit area that the five-day week was going to attract a class of men of supervisory quality. He also said he thought more good men could be attracted if maintenance forces were stabilized.

A long and spirited discussion of training programs elicited comments from G. L. Morrison (S.P.) on his road's student training programs for foremen and college men; and from H. E. Kirby (C.&O.) on the need for convincing managements that they should establish positive and forward-looking programs to assure an adequate supply of well-trained supervisory employees. G. M. O'Rourke (I.C.) and L. W. Howard (I. C.) concluded the discussion with a detailed description of the Illinois Central's program of training supervisory personnel in the maintenance and engineering departments, citing examples of its effectiveness and pointing out some weaknesses that have already been corrected.

Economies To Be Gained Through The Proper Distribution of Ballast

Report of Committee*

• With constantly increasing costs of labor and ballast, it is more important today than ever before to distribute ballast properly. More elaborate means can now be justified to accomplish this than has been possible during past years. It is uneconomical to waste either labor or material at any time, and present costs make it prohibitive for any railroad to allow ballast to be misused or misplaced, requiring labor to correct the situation that would exist. Since the cost of labor has increased more than 75 per cent over the last ten years, the responsibility of seeing that waste of this kind is avoided has risen in the same proportion.

Many economies are possible through the proper distribution of ballast. Some of these are effected by avoiding waste of ballast, wasted labor and unloading costs, bad footing where ballast is too heavy, added car miles and car use in handling ballast wasted, poor drainage where ballast is too heavy, weak track where ballast is too light, poor appearance, excessive labor in installing ties and in lining and surfacing where ballast is too heavy, and lack of uniformity in the track structure and in riding condition. Each of these items can be overcome by the careful unloading and spreading of the ballast after the track has been prepared for it.

A. W. Schroeder
Chairman

It is assumed that when ballasting operations are planned, consideration will be given to doing any bank widening, ditching or roadbed stabilization work well ahead of the ballasting operations. Of utmost importance is adequate shouldering and the building up of the subgrade. Without proper shoulders, considerable ballast can be lost over fills and in ditches. The use of some type of spreader should be made well ahead of the unloading in order to assure an even surface of the shoulder and to avoid mixing the new ballast with old material. If the track has been stripped, or a first raise made and a proper subgrade prepared, there is no reason to mix old material with new ballast, and even distribution of the ballast material within the confines of the track is greatly simplified.

A few railroads have an adequate number of ballast cars to fill their needs during the maintenance season. It is very important that careful plans be made to assign cars to different parts of the railroad in order to assure their quick handling and return to ballast sources as quickly as possible.

On most roads ballast districts are set

*Chairman of this committee was A. W. Schroeder, chief engineer, Chicago & Eastern Illinois, Danville, Ill.; vice-chairmen were W. P. Nichols, general track supervisor, Chesapeake & Ohio, Huntington, W. Va., A. D. Zangar, division roadmaster, Northern Pacific, Spokane, Wash., and J. P. Malay, roadmaster, Chicago, Burlington & Quincy, LaCrosse, Wis.

up, taking into account the kind of ballast most readily available to each part of the railroad. If sources of the proper class of ballast are unavailable to a certain line, stock piles are usually located at some point on the line, with all of the stock piling being done before the maintenance season begins. This provides for the maintenance of a supply of ballast on or near the lines on which such ballast is to be used, and greatly simplifies the programming of the ballast cars.

After ballasting programs have been made up, division officers should make a careful study of the car requirements in order to avoid delays to gangs, and should have a clear-cut program with respect to handling the cars. Such a program should be made up with the aid of transportation officers. Usually one man in a division office is assigned to follow the cars very carefully to see that they are not diverted to other use and are returned to the ballast sources on schedule.

Types of Cars

There are two types of ballast cars in general use. The conventional type hopper, with doors cross-wise, are probably the most prevalent. The enterprise or hart-selective type, which has both side and center doors that can control the amount of ballast flowing, is the most desirable type. With the conventional type hopper car, once the doors are opened, there is no way to control the flow of ballast except by the speed of the train. Very often boards, or stops as they are commonly referred to, are used with some degree of success. Many roads use hooks and chains to control the opening of the cross doors. These are used with various degrees of success, depending upon the exact type of hopper car used. The enterprise or hart-selective car allows for the gradual opening of the doors by means of operating mechanisms to control the flow of ballast.

Very often it is necessary to use the partial-dump type coal car. This is usually when all other ballast cars are in service and additional ballast that was not anticipated is required. In the case of both the partial-dump coal car and the battleship, considerable ballast is wasted by the inability to control the flow, which, in turn, requires labor to handle it to the proper place in the track. The most desirable feature of the enterprise or hart-selective type ballast car is its ability to unload ballast on the shoulder to whatever degree is required for dressing or making a light raise.

In properly planning ballasting operations, it is necessary to pay much attention to the type of ballast car that will be used, or, if a particular type is unavailable, to making plans for proper supervision of unloading operations with the other, less efficient, cars.

In most cases it is desirable to have a regularly assigned work train to handle ballast so that the train can be called to arrive at the location of the ballast unloading operations at the proper time and not interfere with or delay the gang.

The practicability of using a work train depends upon the amount of ballast required daily and conditions characteristic to the particular line where the work is being done. If traffic is such that very little time during the working day is available to a ballast train, it is very often practical to do the ballast unloading with local section forces and use switchers or local way freights to handle the material. If the grade is heavy, consideration to the item of power might be required, since suitable power might not be available for a regularly assigned work train, but might be available in daily switchers, or local freight trains. If the work is being done in climates where rain is often encountered without warning, it may be impractical to have a daily assigned work train, and better to rely upon using regular trains when working conditions can not be anticipated.

The Chicago, Burlington & Quincy was represented by this large group and several others in addition. Shown here (left to right) are: J. F. Foley, rdm.; J. A. Skogreen, mast. carp.; J. L. Mason, rdm.; E. J. Brown, engr. trk.; S. E. Tracy, supt. wk. equip.; F. H. McKenney, dist. engr. m. of w.; Rudolph Srb, mast. carp.; P. F. Huston, mast. carp. (C. & S.); Jay Pickrel, rdm.; H. A. Harnish, rdm. (C. & S.); G. L. Thompson, rdm.; Walter Gibson, w.s. engr.; R. E. Noonan, rdm. (Burl.-R.I.)

The supervision in charge of the gang should place special emphasis on proper instruction of the engineers of work trains as to the proper moving speed. Very often it is practical to have a transportation officer assigned to work trains to see that the requirements of the maintenance-of-way forces are properly carried out and expedited.

Unloading Operations

There are various opinions among maintenance men as to the proper number of men to use in unloading ballast. The supervision in charge of the work usually decides this to its satisfaction, taking into account the type of cars being used, the amount of ballast being unloaded, and the experience of the men in the gang. If extra-gang labor is used in the ballasting gang, very often the supervisor or roadmaster will elect to use regular section men assigned to sections on his territory to do the unloading, for the reason that their abilities are known and they better understand what is required of them. If inexperienced labor is used to do such work, more supervision is usually required as a matter of safety, and to prevent getting too much or too little ballast in spots.

The first thing to do in preparing the ballast train is to "crack" the cars. This will disclose any bad-order cars before the train starts moving—cars that might later interfere with the even distribution of the ballast. If inexperienced labor is used, or section men who are unfamiliar with unloading operation, they should be briefed before the actual work is begun. If the enterprise or hart-selective type ballast cars are used, usually eight men and two supervisors or foremen are assigned to do the actual unloading, each supervisor or foreman having four men on his side of the train. On the stakes set for the ballast raise the total amount of raise to be given the track should be marked. Based on the height of the raise, the amount of ballast required can be measured fairly accurately. If a first raise is being made, all of the ballast should be unloaded in the center of the track and then plowed off to the top of the rail with either a tie or a spreader with the flange nose down. If a raise in excess of seven inches is required, and it is to be made in one lift, it will be necessary to leave a heavy shoulder of new ballast, the amount of ballast in the track being reduced in proportion to the raise of less than seven inches.

Cars should be opened from the front progressively back to the rear of the train, so that if a light spot is left, the following ballast car can be opened enough to equalize the ballast in the light spot. The supervisor or foreman on his particular side of the train should pay strict attention to the quantity of ballast required for the raise and instruct the men opening the cars when each successive car should be opened.

Whenever it is necessary to have men in the cars of a moving ballast train with bottom doors open, the train crew should be informed of this fact and the men should be instructed to handle themselves carefully so as to avoid a fall.

In spite of all information and instruction that can be furnished to the supervision in charge of unloading ballast, the most important thing of all in obtaining a satisfactory job is the ability of the person in charge to judge the amount of ballast required. If a single lift is being made, then sufficient additional ballast will have to be unloaded to take care of the dressing. However, it is always more economical to unload two or three times rather than to get one poor unloading job that will result in hand labor.

If two lifts are being made, the first unloading should be sufficient to take care of the lift and to fill in the track so as to avoid its going out of line and surface, and the second unloading should take care of any light spots left by the

Included in this group (left to right) are: E. V. Cullen, v.p., Cullen-Friestedt Co.; George Murphy, Simmons-Boardman Publishing Corp.; R. J. Gammie, ch. engr., T. & P.; J. B. Templeton, pres., Templeton, Kenly & Co.; J. E. Inman, asst. engr., A. T. & S. F.; R. G. Garland, drafts., A. T. & S. F.

first unloading, with enough material to do the dressing. In case of a heavy raise through a sag, it is the practice on most roads first to unload the sub-ballast material, such as sand or pit-run gravel, following it with the standard ballast. In such cases it usually requires three or more trips with a work train.

If there is still too much or too little ballast left in place after the raise is made, there are various types of equipment that can be used to aid in equalizing the ballast. Among them are the push car, the monorail car, and discing machines and blades propelled by a motor car or pulled by a cable that virtually form a templet of the ballast section. Probably the ballast box can be included in this equipment as it is a box with open end, that rides on a push car and can easily be dumped to the side after being loaded with excessive ballast. All of these various items are labor-saving devices, but still do not approach the economy of a good original unloading job.

Taking into account the type of cars, the characteristics of the work train, and the information given on the ballast stakes, the supervisor in charge of the work has been given all of the information possible to permit him to obtain the best unloading job. Good judgment, together with these aids, should result in the economical distribution of ballast. Close supervision in this respect will pay dividends by saving labor and material.

As mentioned previously, there are a number of distinct advantages in obtaining a proper distribution of ballast, all of which can directly affect the cost of ballasting operations. It is because of this fact that economies can be realized by doing the operation correctly. Waste of ballast can become a huge item under present-day ballast prices. A premium is paid on any wasted labor, especially under present-day rates and the 40-hr. week. Bad footing may result in injuries to train and maintenance forces, and injuries cost money. Added car miles increase transportation expenses, and, while such expenses may not be charged to the ballasting operation, it is reflected in any road's operating figures. Poor drainage will result in fouled ballast and a shorter life, reducing returns on the investment. Track that does not hold line properly is a constant source of maintenance cost, as is excessive labor in renewing ties and spotting track. Appearance and good riding conditions perhaps cannot be expressed in dollars and cents, but they are real assets to any railroad.

Discussion

In reply to a question from J. E. Fanning (I.C.), several members said they had experienced trouble with ballast shunting signal circuits when left between the rails long enough to be rained upon. It was the concensus of these members that slag and cinder ballast were most likely to cause such trouble. C. M. Richardson (A.T.&S.F.) told of an experiment in which slag ballast stockpiled in track produced several cases of red signals. The expectation was that he would either have to remove the slag or raise the track.

Preventing the Abuse of Tools and Work Equipment

Report of Committee*

• Replies from members of this committee, which represents 21 railroads and 7 allied industries, indicate clearly that the members of this association are thoroughly familiar with this subject, and that the abuses of tools and work equipment are not peculiar to any individual railroad or geographic location.

We believe that the abuse of tools and work equipment can be minimized, but whether or not it can be prevented depends upon the individuals' interpretation of abuse and the organization and facilities provided to combat it.

Why are tools and work equipment abused? Is the abuse wilful? Does it result from lack of individual skill? Is it caused by insufficient instruction in the proper care and use, or by improper protection while not in use? Is it caused by using a tool or unit of work equipment for a purpose for which it was not designed? Is it a result of improper or insufficient care while in use, or are they abused for some other reason?

A questionnaire listing these general questions was submitted to members of this committee, and a tabulation of the replies received produced the following results:

S. E. Tracy
Chairman

It is the unanimous opinion of the committee that wilful abuse is not prevalent. There are rare cases, but they are easily detected and the cure is comparatively simple.

Lack of skill, improper or insufficient care while in use, and improper protection while not in use, are contributing factors to existing abuse, but upon these, opinion is about evenly divided as to which might be the largest contributor to such abuse.

It is the consensus of the committee that using a tool or unit of equipment for a purpose for which it was not designed, and insufficient instruction in proper care and use, are the two factors which contribute most to the abuse of tools and work equipment.

It is not our thought that the factors listed exhaust all of the probable causes of abuse, and we realize that those mentioned are closely related and over-lapping, but if these are some of the contributing factors, to what are they attributed and what can be done to minimize them?

The remarks which follow may or may not apply to both tools and work equipment.

The large turnover in labor due to the seasonal nature of maintenance work makes it difficult, to a large extent, to attract a type of labor that is interested

*Chairman of this committee was S. E. Tracy, superintendent of work equipment, Chicago, Burlington & Quincy, Chicago; vice-chairmen were P. S. Settle, assistant division engineer, Pennsylvania, Altoona, Pa., and M. T. Pruett, roadmaster, Southern Pacific, Tucson, Ariz.

in becoming proficient. Much of the time spent in training and supervising this type of employee produces only temporary results. Disciplinary action or incentives mean nothing. Whether the economies gained by skilled workmen will offset the cost of providing a stable force is a problem worthy of considerable study. The latter is easily figured, but the former is not, and the complete answer is not found in the total columns of the payroll.

The deficiencies of some organizational regulations do not permit recognition of the various degrees of individual aptitude and skill. Elimination of these deficiencies would provide some incentive for those with ambition and initiative.

The past several years have been difficult ones, and have contributed greatly to the factor of skill, or the lack of it. But that is history, and a concerted program for the selection and training of men will produce the desired results, and minimize abuses to tools and work equipment which might result from lack of skill.

Insufficient Instructions

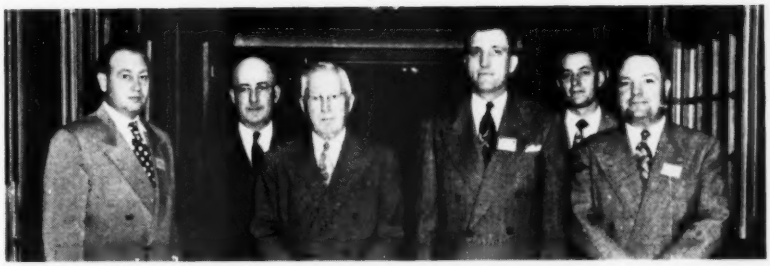
The rapid increase in the ownership and use of work equipment has brought about many additional problems that are not yet fully recognized. The development in equipment has been so rapid that some supervisory officers charged with the responsibility of equipment may not have seen a particular unit until it arrived on his territory. He must, of necessity, depend upon the integrity, knowledge and ability of the operator, who may or may not be proficient. In many cases opinions are based upon misinformation, and are formed in advance of the use of the machine.

The investment in the larger units of work equipment and the nature of the work that is performed by them require movement of this equipment from one territory to another, which results in divided supervisory responsibility, lack of individual instruction, and misinterpretation. To comply with organizational rules, operators of equipment are moved from one machine to another, resulting in divided responsibility and further lack of individual instruction.

Tool and equipment manufacturers furnish service engineers to instruct the workmen and to acquaint supervisory officers with the care and use of their products. The value of their knowledge and experience is recognized and their assistance is highly recommended, but this service is of a temporary or limited nature, and a permanent organization is essential.

The type and size of organization is, of course, a matter for consideration of the individual railroad and the conditions peculiar to that railroad, but it should be large enough to provide frequent individual instructions to equipment operators and to acquaint supervisory officers with the methods of operation. In this connection, we refer to A.R.E.A. Proceedings, Volume 47, Pages 182-192.

It is not the thought of this committee that the total number of printed instructions is insufficient, but that the individual instruction of all concerned is insufficient and inadequate. The thoughts expressed in the preceding paragraphs on skill are applicable to this item as well. Men highly skilled in their work have little need for instruction on the care and use of tools and work equipment. A training program of individual instruction during and outside of the regular working season will do much to reduce abuse.



Shown here are some of the Milwaukee men who attended the conventions, and one supply company representative. Left to right: W. A. Walker, rdm.; C. L. Boland, asst. to engr. m.w.; T. H. Strate, div. engr. (retired); R. G. Simmons, asst. to engr. m.w.; P. J. Wolf (Maintenance Equipment Co.); K. L. Clark, div. engr.

Seasonal and intermittent use of tools and work equipment makes it necessary to provide adequate storage facilities during the slack season, and to furnish tarpaulins, suitable storage boxes, bins and racks at toolhouses and on motor cars and trucks to afford protection during the work season. Rust, corrosion, dirt and other foreign matter may not have an immediate effect, but protection against accumulations will increase the useful life of tools and equipment.

Damage from freezing should be easily controlled, but many machines are damaged and require extensive repairs because of the lack of storage facilities, or improper or inadequate supplies. Furnishing sketches covering the loading, unloading and blocking of equipment will provide for the protection of equipment while en route.

Improper protection while not in use may be considered as an abuse rather than one of the causes of abuse, but unless the men in the field are provided with the facilities for proper protection of equipment and tools, it then becomes a reason for abuse.

Tool and equipment manufacturers publish the specifications of their product, and in most cases they have designed it for an occasional misuse. The varying conditions under which tools must be used and work equipment must be operated make it necessary, in some cases, to use them for a purpose for which they are not designed, but this should be the exception rather than the rule. Skilled workmen will, of course, minimize these abuses with a minimum of instruction and supervision, but, unfortunately, this condition does not always obtain.

The overloading of trucks, motor cars and push cars, and the handling of overloads with cranes might easily occur unless the man in the field is furnished some basis for estimating the weight of the material to be handled.

The use of equipment to perform work formerly done with hand tools usually requires a different technique in the preparation and method of handling, and this must be taken into consideration. Providing the men in the field with the necessary tools for the job to be done, and programming the work and assigning the proper unit of work equipment will minimize the cause for abuse due to using them for a purpose for which they were not designed.

Improper Care While In Use

Most manufacturers furnish detailed instructions and charts on lubrication, and the oil companies are anxious to assist in this problem, but that is not enough. Some means should be provided for converting named brands to equivalents of other brands. Suitable containers which prevent the entrance of water and other foreign matter must be used and should be marked to show the type and viscosity of fluid lubricants. The size of the container in which lubricants are shipped or are stored in the field should be consistent with the size and type of equipment.

Hand tools furnished with the original equipment are in many instances inadequate for the purpose intended. These must be supplemented, as necessary, to permit proper maintenance.

The problem of keeping hand tools, catalogs and instruction books with the machine is a difficult one, particularly when operators are changed frequently and the machine is moved from one territory to another. A practicable method of preventing these losses will minimize abuse due to lack of care.

Proper lubrication and preventive maintenance cannot be done spasmodically, and sufficient time must be allowed. The A.R.E.A. "Handbook of Instructions For the Care and Operation of Maintenance of Way Equipment" covers this topic thoroughly and is commended to you.

Tool manufacturers publish detailed charts showing the service limits of chisel heads and the faces of sledges, and the limits of wear. They also provide templates to serve as a guide in grinding and resharpening. These publications and the A.R.E.A. "Specifications and Plans for Track Tools — 1946" supplemented by proper equipment with which to perform the work, will provide means for minimizing abuses to tools from lack of care.

It is essential that we provide the necessary supplies and adequate facilities to encourage proper and sufficient care while tools and equipment are in use, or this factor also becomes an abuse.

In this group are five representatives of the Chicago & Eastern Illinois and one of the Chicago, Burlington & Quincy. They are (left to right): D. B. Jenks, v.p. and gen. mgr.; I. A. Moore, asst. ch. engr.; H. Huffman, gen. rdm.; J. E. Bernhardt, engr. struct.—all C. & E. I.; H. R. Clarke, ch. engr., C. B. & Q.; A. W. Schroeder, ch. engr., C. & E. I.

Preventing the abuse of tools is an old problem with which everyone is familiar. Hand tools are being replaced by power tools and work equipment and the problem of abuse becomes more complicated.

Conclusions

Abuses from any cause will lead to immediate or premature failure of a tool or a unit of work equipment. The first step in preventing abuses of tools and work equipment is to eliminate the cause. They can be minimized and should be reduced in direct proportion to the type of organization set up to control them and the facilities furnished such organization. Reference has been made to the type of organization suggested by the A.R.E.A. The cost of such an organization can be readily calculated, but it is difficult to calculate the savings which can be realized by preventing abuse, and the increase in operating efficiency which will result. Delays due to breakdowns are costly and far reaching in their effect upon economical operation.

Discussion

T. H. Nelson (S.P.) made the observation that to delay repairs to equipment often proves very costly, and expressed the opinion that the report should include a recommendation that equipment in need of repair should be shopped promptly. He added that the proper hand tools must remain with the equipment as it is moved from point to point. E. M. Dougherty (Sou.) recommended the practice of studying various units of equipment, with the cooperation of mechanical engineers, with the view of eliminating potential causes of abuse.

E. E. Crowley (D.&H.) stated that much abuse of power tools and roadway machines results from a lack of mechanical knowledge on the part of foremen and operators. Because of this, he said, frequent inspection by competent mechanics must be regularly scheduled. Such inspection, he added, should not be the responsibility of local supervisors, but should be the function of a separate work-equipment organization under the jurisdiction of the chief engineer. He said that mere questioning of operators and foremen will not bring out the truth regarding the condition or production of a machine, because in many cases these men will give inaccurate information to avoid criticism of their work.

R. K. Johnson (C.&O.) stated that the development of equipment is now ahead of the railroads' organization for operating the equipment and keeping it in repair. This situation, he stated, calls for greater care in selecting operators and in instructing them in their duties. "Operators are the first line of defense," he said.

E. L. Collittle (St.L.-S.F.) observed that "under-maintenance breeds abuse," adding that this is of special importance on smaller roads which have so few machines that replacement units are not available when breakdowns occur. Chairman Tracy, in concluding the discussion, agreed with all of these observations. He added that in too many cases operators are drawn from seasonal workers who have no real interest in their work.

The Relation of Supervision to Maximum Production of Track Gangs

Report of Committee*

• Supervision for the purpose of this report is regarded as including those employees ranking between the division engineer and the foremen in charge of track gangs—namely: general or division roadmasters, district roadmasters or supervisors of track, and general foremen or other employees who have overall charge of a number of track gangs.

The duties of supervisors are many and varied, practically all of which have a direct bearing on the efficiency and productivity of the gangs under their direction.

Training of Men

A most important duty of the supervisor, and one which has a direct bearing on the amount of work done by track gangs, is the selection and training of foremen and trackmen. The duty of carefully selecting men was never so important as now in these days of seniority and the necessity of fully justifying and defending every case of discipline assessed, or man dismissed from service. The advent of numerous power-operated machines has brought about great changes in doing track work; has brought about changes in methods and forces used in doing work; has brought up the necessity of carefully co-ordinating the work of various specialized gangs using this equipment; and has made the training and education of foremen and men a continuing duty of the supervisor, so important that his success in the training of his men is almost the measure of his success in handling his work.

The supervisor is the railroad company to many of the men working under his supervision, and if his handling of his men is proper, there will be much personal loyalty to the supervisor rather than to the railroad company itself. Men will put forth more effort in their work to please their supervisor than they will because of any loyalty to their company.

The better the knowledge the supervisor has of all the different tasks performed by trackmen the better he will be able to instruct and train them in their work, and the more respect the men will have for his ability as a trackman. He must be able to talk the language of trackmen and issue his instructions in a clear and concise manner which his men can understand.

When men feel they are accomplishing worthwhile work and doing it in the proper manner, so that they can look back on a day's work and feel that they have had a part in accomplishing a good, worthwhile job, they become as interested in their work as is the supervisor himself. There are always some men in gangs who have had long experience in railroad work and who are quick to detect any lack of knowledge or weakness on the part of the supervisor. If their respect for the supervisor's ability lessens, they will lose interest in the work.

Most railroads do not have any system

*Chairman of this committee was O. H. Carpenter, general roadmaster, Union Pacific, Pocatello, Idaho; vice-chairmen were M. D. Packham, roadmaster, Atchison, Topeka & Santa Fe, Emporia, Kan., O. C. Prewitt, district roadmaster, Texas & Pacific, Marshall, Tex., and N. M. Cary, track supervisor, Southern, Greenwood, S. C.

of special training for track foremen and men, who must learn their trade from what they are shown and taught by other, more experienced men in the gang, and by their foreman and the supervisor himself. This training and education must be a continuing process in order to keep all men abreast of changing methods of doing work and up to date on the handling of new ideas in power equipment. The better-trained foremen and men make fewer mistakes, with less waste of material and labor, and are able to progress their work in a more expeditious manner.

Shown here are some of the St. Louis-San Francisco men who attended the meetings. They are (left to right): James H. Brown, studt. appr.; W. G. Robinson, rdm.; J. R. Trower, rdm.; S. Payson, rdm.; John Sumner

Organization

The second great task of the supervisor is organization of his men and their work. Regardless of whether the task is great or small, the best efforts will be put forth and the work completed more quickly if it is properly organized. In former times a short section of track was assigned to a section foreman and he was expected to do all of the work necessary on the track assigned to him, except ballast and rail renewals, which were ordinarily done by an extra gang. It was left up to the foreman to make all inspections of the track and to take care of any defects found, including the renewal of ties and smoothing and lining the track. He was left to organize his work in his own way, and the work was done more or less on a seasonal basis. The supervisor was generally assigned to a rather long territory and made visits to each gang at intervals of a week or ten days. This resulted in about as many ways of organizing and doing work as there were foremen on the supervisor's territory.

Sections Now Longer

Most railroads have now lengthened sections to about twice what they were at that time, and at the same time rising labor costs have made it necessary to reduce the number of men allowed on sections. As a result, the locating of spots requiring attention to line and surface and the lining up of work to be done has fallen to the supervisor in order to allow the foreman and gang to spend more time actually working and avoid waste of time looking for places which require work. The better the organization is perfected to provide men to make inspections, and to give the locations of required work to the foreman, thus allowing him to spend more of his time in actual productive work, the more will be accomplished by the gang.

To compensate for the reduction in section gangs and to take full advantage of power-operated equipment, special gangs equipped with the proper machines and organized to work with them are sometimes used to relay rail, reballast and resurface tracks, construct trackage, spot surface and line tracks, make changes in alignment, or to do other large jobs as required. In some cases several gangs may be used to progress the project as a whole, each gang doing the part of the work for which they are equipped. This is where the organizational skill of the supervisor is tested. The work of the various gangs must be co-ordinated so that all gangs will work smoothly and each do its work without interfering with the others. It may be expected that unforeseen delays will occur which will have to be handled on the ground by someone having overall charge of all the gangs.

What Supervision?

Where the job will last only a few days, the regular supervisor assigned to the territory should be able to handle the work of these gangs, but someone should be constantly in charge. If the work is to be of long duration a general foreman or other supervisor should be assigned to keep the gangs working smoothly, make the necessary contacts with dispatchers and operating officers, see that the proper train orders are placed and kept up to date as the work progresses, and be sure that proper flag protection is provided for the job as a whole.

Some railroads find it advantageous to assign an operating officer with the larger jobs, but this is not considered necessary unless the work will seriously interfere with traffic or a number of work trains are being used in the same locality. If the roadmaster or supervisor is required to handle large special jobs without additional supervision, the work of the other gangs on his territory will suffer and production will fall.

Eliminates Wasted Effort

It is our belief that money spent for a supervisor in constant charge on large jobs is well repaid through elimination of wasted effort and greater co-ordination of the work being done. It may be advisable in some cases to give the most competent extra-gang foreman overall charge, but usually the time of the foreman selected is kept fully occupied supervising the work being done by his own gang to keep it in full production. Furthermore, the foremen of other gangs who have equal rank will not respect the instructions of another foreman as they will a ranking supervisor.

The supervisor on whose territory the work is being done should be responsible for the progress of the work in a satisfactory manner and he should keep in close touch with it and confer with the general foreman frequently to know just what work is being done and how the gangs are organized.

Proper organization of the work with sufficient flexibility to permit adjustments to take care of unforeseen delays and failure in the delivery of materials, bad weather and breakdowns of equipment, will go a long way toward insuring maximum production.

Equipment and Forces

To secure maximum production all machines and men required for a job should be on hand as needed so there will be no waiting for equipment to arrive on the scene. Men should be made available as needed, but care should be exercised to see that no more men than are required are assigned. However, machines that are being used to advantage at other locations should not be moved to a job until they are actually needed. Likewise, as soon as they have done their work on one project they should be

During the joint sessions the Stevens' North Ballroom was filled to near capacity

The conventions offered an opportunity for many of the A.R.E.A. committees to get together. Shown here are some of the members of Committee 27, Maintenance of Way Work Equipment. They are (left to right): W. M. S. Dunn, gen. rdm., N. Y. C. & St. L.; W. G. Luebke, supvr. wk. equip., D. & R. G. W.; E. L. Anderson, asst. ch. engr., St. L.-S.F.; R K. Johnson, supt. wk. equip., C. & O.; Murray C. Taylor, supvr. wk. equip., L. & N.; A. H. Whisler, asst. engr. mw., P.R.R.; C. E. Stoecker, asst. div. engr., L. & N.

moved elsewhere if there is need for them. Careful study and planning will secure the maximum use of machines over the territory and increase the production over the entire district.

All jobs should be studied and planned in advance so that machines and forces can be made available at the time they are needed and not before. Work should be planned so that it will be done in the proper sequence, and the supervisor must determine which parts of the work must be done first to avoid confusion and overlapping of work. Furthermore, he should make every effort to get the jobs which must be done first finished, so that other work may start, assigning additional men and machines if required.

It must be borne in mind that the effective use of power machines requires their being in the proper mechanical condition and ready for work when needed. Broken-down machines will disorganize work very quickly and will result in loss of production. It must be the business of the supervisor to know that his machines are kept in working order. To this end a competent mechanic should be assigned to keep machines in good order, to see that they are properly lubricated and cared for, and to see that they are not abused by the operator in any way. The mechanic should also keep a small stock of spare parts on hand for ready use in making repairs when necessary.

A regular program of shopping power equipment during slack seasons should be in effect so that machines can be expected to go through the working season each year with the minimum of breakdowns and delays. On-line repairs should be held to the minimum. It is not only the work being done by a particular machine that is delayed when it breaks down, but the work of the entire gang.

Tools, Supplies, Materials

The supervisor must see that his gangs are furnished the proper tools consistent with the work to be done, and that they are properly used and cared for. Men will not produce the maximum amount of work unless they have the proper tools in good condition. Gangs must not be allowed to have more tools than they need or to waste supplies, but the proper amount of tools and supplies must be provided to insure maximum production from the money expended for labor.

The required material for any job should be requisitioned in advance and delivered to the job as needed. The best arrangement is to have enough of the various kinds of material on hand to start the work and then have the remainder delivered as it is required for use, eliminating the necessity of unloading and storing material in a material yard and rehandling it again to the job. A considerable saving is effected if the material can be unloaded immediately at the location where it will be used. Care must be exercised to see that gangs are not required to await the arrival of material, as this results in loss of production and disorganization.

The arrival of ballast trains should be such that the train will be on hand and ready to unload the ballast when gangs have the track prepared for it. In distributing material for rail relays the material should be unloaded far enough in advance of the relay gang to insure that it will not run out of material and to avoid the necessity of work trains passing through the location where gang is working. This should be avoided as far as possible in all jobs, as work trains passing through gangs delay them and cause loss in production. This will require planning on the part of the supervisor, but will be well repaid in extra production by the gangs.

Discipline

An efficient gang must also be a well disciplined gang. An effort must be made to keep out agitators and men who do not want to follow instructions. Drinking or carousing must not be permitted around gangs. Supervisors must interest themselves in this feature, and take corrective action as necessary to insure men being in proper physical condition.

Enforcement of safety rules and practices should be borne in mind by supervisors at all times. Personal injuries and accidents cause loss of time and loss of morale among the men in gangs, and production suffers as a consequence. A safe gang of workmen is generally an efficient gang.

Where boarding facilities and lodging are furnished to the men in track gangs, the supervisor must check frequently and see that proper facilities and food are provided. Men will not stay in gangs where these facilities are not satisfactory, and the work being done will suffer in consequence.

The supervisor should visit all gangs under his supervision as often as possible, consistent with the length of territory under his supervision, the number of gangs working, and the amount of other work, inspections and tests which he must make. He should spend more time with gangs doing the larger and more important jobs, and to acquaint himself with what goes on during his absence, he should occasionally make surprise observations of gangs at work.

On some roads the supervisors' territories are such that almost daily visits can be made to all gangs, while on others, territories and supervisors' duties are such that visits can only be made once or twice a week. However, supervisors' territories should be such that all gangs can be visited at least once a week, and we feel that visits should be made at least twice a week for best results.

An effort should be made by the supervisor to keep all gangs lined up with work for several days ahead, so that in case some emergency arises which keeps him away for some days the gang will have plenty of work lined up to do. When section and other small gangs run out of the work lined up for them they are prone to work on inconsequential work that may not be necessary, or that could be deferred and done during bad weather.

Outlining Work

Gangs which have their work properly outlined by the supervisor will accomplish more than those which have to look for work to do themselves. The ability and experience of the foreman determines to a large extent the amount of detailed outlining of the work which must be done by the supervisor. Some foremen require very little in the way of detailed instruction on how to perform track work, while others must be instructed in every detail.

The supervisor must be well acquainted with the ability, and also the shortcomings, of all his foremen, and handle instructions to them accordingly. The better he knows his foremen the more success he will have in securing the best performance from each individual foreman, and through him, from the men in the gang. He should have his plans made so that once he has issued instructions he will not have to change them. Nothing disrupts a gang more than to have the supervisor change his mind about how a piece of work will be done and change his instructions after the work has been started. This always results in waste of effort and loss of time, and should be avoided as much as possible.

The supervisor should make sufficient checks of the work after it is completed to know that it has been done properly. This also has the advantage of letting the foreman know that his work will be checked, and encourage him to see that a proper job is done. With the organization of gangs and track work now being

done on a district or division basis, instead of on a section or job basis, as formerly, and considerably more advance planning of work being done, the entire track force employed under one supervisor now acts as a single organization, of which he is the head. Thus his decisions and handling of work have a more direct bearing on the amount of work done by gangs now than ever before. This will probably increase as track work becomes more specialized by reason of the advent of more power equipment and different methods of organizing and doing track work.

The higher speeds of trains have made it necessary to have a more flexible, efficient organization, ready to handle any emergency that may arise, and to keep delays to traffic to the minimum. The amount of work done by the gangs and the efficiency of the entire organization depend very much on the ability of the supervisor and his efforts in planning and expediting the work.

Discussion

In the absence of the chairman this report was presented by R. G. Simmons (Milw.), a member of the committee.

This group from the Southern Pacific traveled a long way to attend the conventions. Included (left to right) are: G. L. Morrison, asst. engr. m. of w. and s.; E. E. Earl, div. engr.; O. R. Rogers, Jr., safety insp.; C. J. Kennedy, rdm.; W. J. Jones, asst. div. engr.; T. H. Nelson, rdm.; T. P. O'Keefe, asst. div. engr. (N.W.P.)

In discussing the report G. L. Sitton (Sou.) spoke briefly on the necessity of a supervisor knowing what constitutes a day's work so that he can better organize his forces and program his work, as well as know when his forces are efficient or inefficient. He told also of the need for supervisors to become mechanically minded, at least to the extent that they will know how to keep in serviceable condition the machines allotted to them.

G. L. Morrison (S.P.) warned of what he called "over-supervision," which could easily grow out of too strict adherence to that part of the report recommending that supervisors make an effort to keep all gangs lined up with work for several days ahead. He said that this policy carried to extremes would destroy the initiative of foremen—sometimes to the point where they might do nothing until told to do it. That situation, he said, is obviously to be avoided.

Recent Developments in Transportation of Maintenance-of-Way Track Forces and Materials

Report of Committee*

• In studying recent developments in the transportation of maintenance-of-way track forces and materials, it becomes readily apparent that the greatest advances have been made in the field of highway transportation. During the recent war period many roads were driven to the necessity of putting section forces in trucks on their heavier traffic lines when increased rail traffic made it difficult to move motor cars over the railroad. This was particularly true on those lines where centralized traffic control was in use.

Trucks for Section Forces

In studying this subject, a questionnaire was sent out and replies were received from 14 representative railroads with trackage reaching into all parts of the country. These replies indicate that the use of highway transportation in the maintenance-of-way department is being expanded on practically every road.

Prior to 1942 many railroads used highway transportation for those sections located in large terminals where the movement of motor and push cars was made difficult by heavy rail traffic, and where

L. F. Barrs
Chairman

the need for the use of trucks was immediately apparent. On some roads it was the practice to have a pool of trucks in the terminal, the trucks being dispatched by a central dispatcher and used by all departments. During the war years, however, the need for truck transportation in the maintenance-of-way departments increased and many roads purchased vehicles for the sole use of their maintenance forces. Furthermore, the practice of using highway transportation was extended from main terminal points to line-of-road sections. This trend has continued and now many roads report whole sub-divisions and divisions entirely motorized, with vehicles allotted to each force on the division or sub-division.

Savings in Working Time

Roads using trucks for the regular transportation of section forces to and from work report minimum savings in productive working time in the order of one hour a day for those forces so equipped. In some cases this saving in productive working time has amounted to much more than one hour a day. In addition to the time saved in the work day, many roads have been able to reduce overtime payments formerly experienced by reason of forces being held away from their headquarters by dense rail traffic when using motor cars.

Another factor figuring largely in the saving of time achieved through the use of highway transportation is the ready availability of tools. It is the practice of many roads to keep regularly-used tools in the truck from day to day and to leave them in the vehicle when parked in its garage at night. By so doing, the force is able to save 10 to 15 min. at the beginning and close of work, which would

*Chairman of this committee was L. F. Barrs, roadmaster, Seaboard Air Line, Richmond, Va.; vice-chairmen were W. W. Chaffee, track supervisor, New York, New Haven & Hartford, Guilford, Conn., and H. S. Smith, track supervisor, Chesapeake & Ohio, Grand Ledge, Mich.

These men from the N. Y. N. H. & H. are (left to right): E. E. Turner, supvr. wk. equip.; J. B. Bell, engr. trk.; V. J. Gravagan, trk. supvr.; J. M. Reardon, trk. supvr.; A. A. Cross, engr. m.w.; J. L. Holmes, supvr. b & b.; G. L. Ellms, trk. supvr.; J. L. Rippey, gen. supvr. b. & b.

normally be consumed in putting up tools and getting them out when using motor car transportation.

B. & B. Forces Put on Highways

The practice of using highway transportation for bridge and building forces is even more widespread than is the practice of using such transportation for section forces. On many roads B.&B. forces are stationed in outfit cars, carrying their tools, supplies and equipment with them on these cars. Many roads assign a 1½-ton to 3-ton truck, equipped with a dump body, to these forces to transport them between their outfit cars and the location of the day's work. During the day the truck is used to haul lumber, hardware and other materials to the site of the work, making unnecessary the use of rail transportation with accompanying delays due to train interference. The practice of assigning light trucks to sign painters, carpenters assigned to small repair work, other small B.&B. forces and welding forces, is widespread to the point of being general.

Special Service Trucks

Highway transportation is ideally suited to the needs of many employees, such as roadway department mechanics, welders, water service employees, scale repairmen and signal maintainers. It is the practice on many roads to outfit these employees with trucks especially designed for their work. In the case of roadway mechanics employed to repair on- and off-track equipment on the line of road, a van truck equipped with a small machine shop is used. So equipped, the mechanic can handle any equipment repairs found necessary on the line of road. Water service employees are furnished with trucks carrying all the equipment necessary to their work.

The practice of assigning highway transportation to track supervisors, bridge and building supervisors, signal supervisors and engineering department personnel is on the increase. It is the general practice to assign a ½-ton or ¾-ton pickup truck to the supervisor. The supervisor uses the truck to visit gangs at their work locations and to carry tools, supplies and equipment to his forces. Some roads assign panel trucks, station wagons or passenger vehicles for the use of supervisors. However, this practice is not widespread and the pickup truck is generally conceded to be more suitable for the supervisor's use.

In some cases highway transportation has been restricted to those locations where the public road network either parallels the track or is sufficiently close to the track to allow easy access to and from the railroad. With the increase in use of highway transportation, and after observing the economy available through its use, many roads are providing driveways along the right-of-way for the use of company vehicles. At the present time this practice is in its infancy, but it appears to be on the increase. When such driveways are provided, steps must be taken to insure that they do not become public roads, with the result that the railroad loses full and free use of its right-of-way. The general practice at the present time is to provide a semblance of a driveway when earth-moving equipment is working in the vicinity, and when the work can be done at the least expense.

Transporting Large Gangs

Highway transportation has been put to excellent use on many railroads in transporting large gangs, such as rail-relaying gangs or out-of-face ballasting gangs, between their outfit cars or permanent work camps and the locations of work. Some roads use highway buses capable of carrying 30 to 36 people. It is more general, however, to use 1½-ton or 2-ton trucks provided with seats, the trucks being used during the day to bring in necessary supplies and the noon-day meal, and to do other work necessary with the truck.

It has been found that if the location of work is more than ¼ mi. from the nearest road, the time consumed in walking from the road to the location of the work, and back, must be weighed against the use of motor car transportation with its possible train interference. In some instances where buses are used, it is the practice to assign a small truck to the force for the purpose of transporting miscellaneous small supplies and food.

Selecting Type of Vehicle

The type of vehicle to be used for a particular job must be selected with all of its proposed uses in mind. Accordingly, the type selected will often vary for the same general type of force, depending on local conditions. The 1½-ton stake body truck is a popular size for section and B.&B. use on many roads. However, some roads use a 2-ton, or even a 3-ton, truck with both section and extra gangs. On many roads a dump body is used rather than a stake body, and in practically all cases the truck body is provided with some type of cover to keep forces riding the truck out of exposure to the weather.

In some cases the cover provided is a canvas cover. However, some roads have provided a special body for the use of maintenance-of-way forces, which has a cover on it and space built in for carrying tools and other equipment, similar to the trucks used by power companies and other utilities. These vehicles are much more expensive than the standard open-body truck, but have much to recommend them.

Transporting Heavy Equipment

The transportation of heavy equipment, such as bulldozers, draglines, motor graders and other heavy off-track equipment, from point to point by highway truck and trailer is practical, economical and speedy. During the winter months, icy roads and snow may delay or make such movements impractical or hazardous. However, projects requiring the use of heavy equipment are generally carried on in periods of good weather and experience has shown that there is economy to be realized in the use of trailers for moving equipment of this type. Trucks and trailers are especially helpful in moving heavy equipment to the scene of washouts and derailments. Some states have laws seriously restricting the use of heavy equipment trailers, both as to weight and side clearance, and such laws should be carefully checked before purchase is made of this type of equipment.

Many advantages are realized through the use of highway transportation for the maintenance-of-way forces. Such transportation is especially helpful in moving forces quickly to the scene of trouble in case of accidents. Forces may be brought quickly from distant points when it is necessary to assemble a large force to take care of trouble. In addition to the time saved by the use of highway transportation, accidents have been materially reduced and gangs have been made much more flexible. In some cases it has been possible to eliminate outfit cars, resulting in improvement of the morale of employees and increased production.

It is the general practice for roads to purchase and own outright units of highway equipment. However, several roads report that their foremen are authorized to hire truck equipment in the vicinity of the gang when such equipment is found desirable or necessary. In at least one instance space is provided on the foremen's time report for showing drayage used.

There appears to be no widespread use of equipment designed for use on both highway and rail. Some roads have one or two units of such equipment. When this equipment is operating on the rail, it has all of the disadvantages found in the motor car. If highways are available, the vehicle can move with greater dispatch and safety on the highway than it can on the railroad. On many roads a conductor or some form

of train crew is required when rail-highway equipment is used on the track, which is a serious deterrent to the use of such equipment on the track.

Motor-Car Transportation

In the field of motor-car transportation, the improvements and advances noted have been largely in facilities provided for the protection of such cars when operating over the track. It has now become standard practice on many roads to provide motor car operators with portable telephones, with which to secure lineups from the train dispatcher for the protection of the motor car. On some roads these telephones are equipped with an extension pole so that the terminals can be attached directly to the train dispatch circuit. On other roads it is the practice to equip the portable telephone with a plug-in type jack, and to place a receptacle for these plugs at each mile post or each signal location—the practice varying on different roads. In addition, motor car signaling has been provided on many heavy-traffic lines in order to assist the motor car operator in covering his territory.

There are many locations in undeveloped territory where motor cars will be used for years to come, and where driveways for motor vehicles would be too expensive to justify any attempt to provide such driveways. All roads making use of highway transportation for section forces use motor cars for track inspection work, for no better means has been found to carry out this work.

Other recent developments in the field of motor car operation take the form of improvement in design of both the power plant and the motor car, with the view to making motor car operation more flexible and dependable.

While the highway truck has shown itself to have definite advantages in the transportation of maintenance-of-way track forces and material, the chief burden of handling roadway materials, such as rail, crossties, ballast and other heavy track material, still falls to the work train or to local train service. No other means of transportation has been found to be as efficient as the work train in handling bulky materials. To obtain the greatest economy in work trains, it is necessary that the work be programmed in advance and materials ordered in sufficient quantity to make the use of the work train profitable. While this is true of all classes of materials handled by work train, it is particularly true in the distribution of crossties for renewals.

It is the conclusion of your committee that highway transportation offers a field for definite improvement in speed, dependability, economy and safety in the transportation of maintenance-of-way forces and materials. In selecting equipment, care must be exercised and thorough studies made of the job necessary to be done so that the proper vehicle required for the work can be selected. It is also necessary that the economic need for the equipment be carefully looked into in order that the equipment may be placed on the job and at the location where it will produce the greatest economy.

Discussion

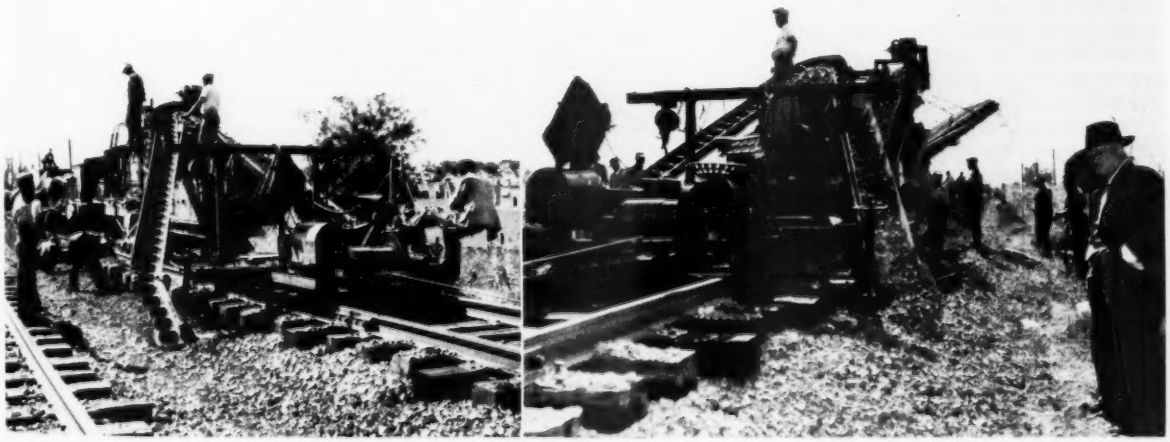
In reply to a question from G. L. Morrison (S.P.) as to what those roads that were using trucks were doing about track inspection, Chairman Barrs said that each road was keeping its motor cars for this purpose, and A. G. Reese (C.B.&Q.) stated that, in many cases, track inspectors patrolled the track on motor cars while the gangs went to work in trucks.

A. H. Whisler (Penna.) spoke of the advantages that his railroad had found in special-service trucks for welding gangs, etc. He also pointed out, in speaking about roadways along the right-of-way, that the road need not be hard surfaced. In fact, he said, a few passes with an angledozer will usually suffice to make a presentable roadway. For section gangs, Mr. Whisler recommended small trucks with special bodies similar to telephone linemen's vehicles, with compartments for tools and supplies. He said that, although this type of body might be slightly higher in first cost than a plain pick-up body, it would preclude the foreman being classed with the plumber who never had the right tool to do his work.

Opposing this latter viewpoint, T. H. Nelson (S.P.) stated that he preferred to use light trailers to carry tools, so that, upon reaching the job, the trailer could be disconnected and left with the gang, while the truck was free to be assigned to other work that might be necessary.

E. L. Banion (A.T.&S.F.) asked the committee if any study had been made of the advantages that might accrue to a railroad if it were to standardize on the purchase of a "fleet" of trucks of a single make. He expressed the opinion that economies could be realized from such practice, especially in the purchase of repair parts. In reply, A. G. Reese (C.B.&Q.) stated that most railroads had been glad to get any make of truck up to the present time and that he knew of no railroad that had standardized on any particular "fleet."

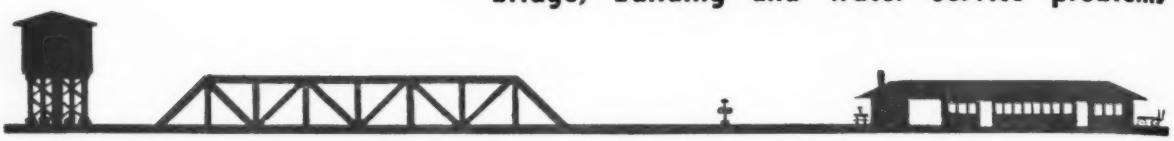
The remainder of the discussion was devoted to a recital of the practices of several roads in assigning men to drive trucks and in the rates paid these drivers.



RAILWAY OFFICERS SEE MATISA BALLAST CLEANER—Two views of the Matisa ballast cleaner in action on the Santa Fe, near Fort Madison, Ia., taken during a recent inspection by a group of railway officers, which included Maurice LeMaire, president of the International Union of European Railroads, Paris, France, who is shown at the extreme right. The party was told that this machine, which renovates the entire ballast section, continuously beneath the ties, has cleaned up to approximately 25 mi. of track on the Santa Fe during the current year, averaging 1700 ft. per eight-hour day, with a maximum of 2,776 ft. in one day. The potential capacity of the machine was said to be 3,000 ft. per eight-hour day of uninterrupted work. The view at the left shows the digging and carrying units of the conveyor moving downward into the ballast, while that at the right shows the same units moving up the discharge side of the conveyor, carrying the fouled ballast to the screen.

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Using Power Chain Saws

For what purposes can power chain saws be used effectively in bridge and building work? What savings can be realized through their use?

If Sharp, Men Demand Them

By F. R. Spofford
Assistant Division Engineer, Boston & Maine, Dover, N.H.

Power chain saws can be used effectively for any work formerly done with a two-man cross-cut saw. Savings to be realized depend on the type of saw and the amount of work to be done at one location at one time.

A self-contained power chain saw with an air-cooled gasoline engine has the advantage of not needing a separate power plant. This makes it particularly effective for jobs requiring only a few cuts. It has the disadvantage, however, of being somewhat heavier and larger than one operated by compressed air or electricity.

Careful selection of the smallest and lightest saw that has sufficient cutting capacity is necessary to obtain the best results. For jobs in which a large number of cuts are required at one location, power chain saws operated by compressed air or electricity are preferable.

Careful and precise sharpening and setting of the cutting chain are essential. Maintenance of the saw on a preventive basis produces the best results. A few bad cuts from a poorly sharpened chain or other defective condition will produce among the men using it prejudices that will limit the usefulness of the machines.

In ordinary "program" construction, power chain saws easily justify themselves on a basis of money saving. By the use of preframed treated timber, field cutting is reduced to the minimum. To receive the caps, trained men can cut off piles as good with a power chain saw as by hand and at a considerable saving in labor —if the saw is in good condition. This operation is facilitated by the use of auxiliary attachments which assist in guiding the saw.

The clearing of trees from tracks following wind damage can be expedited with power chain saws. In fact, where large trees must be removed from the right-of-way account of hazard to wires or tracks, savings can be made by using power chain saws operated either by bridge and building crews or by trackmen.

In emergency construction of untreated timber trestles following a fire or flood, power chain saws are essential to a rapid completion of the work. If not used in regular work, they should be kept available and men trained in their use for this contingency.

If power chain saws are properly sharpened and maintained so that no prejudice against their use becomes established, men having to cut heavy timber, piling or trees will call for them without pressure from supervision. When this condition is established we may be sure that they are effective and economical.

Savings Are Obvious

By J. P. Dunnagan
Engineer of Bridges, Southern Pacific, San Francisco, Cal.

We have a great many 24-in. two-man pneumatic chain saws and a few 18-in. one-man gasoline-operated chain saws in use and find them highly satisfactory. While we have not made any economic determination as to savings, such savings are so obvious that their demonstration is not necessary.

We have found that in new trestle construction we can make a pile cut-off with a power chain saw as accurately as by the old two-man diamond-point, cross-cut saw, and in about one-fifth the time.

In the framing of large bridge and

Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 79 W. Monroe St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the December Issue

1. What are the advantages and disadvantages of elevating the outside rail of a tangent, flat-yard ladder? Under what circumstances are elevated ladders justified? How much should the elevation be? Explain.

2. What are the advantages and disadvantages of office partitions less than ceiling height? What type of construction materials are adaptable for such partitions? Explain.

3. When is the best time to end-harden rail—in the mill, immediately after being laid, or sometime later? Why?

4. What are the best methods of cutting off precast concrete piles? Describe.

5. What advantages can accrue from the practice of supplying work trains with sets of custom-made slings designed for specific purposes, in place of slings homemade from discarded wire rope? Explain.

6. In the event of complete Dieselization of a division or an entire railroad, to what extent can unneeded water facilities be sold to industries, farmers, communities or other outside parties? Cite examples of such sale.

7. Under what circumstances does asbestos-cement building siding require painting? Can this be done effectively? What precautions should be observed? Explain.

tunnel timbers these saws have also been found to be effective. In the replacement of trestles, where the old piles must be cut off at the ground line and extreme accuracy is not required, the time saving is extreme in amount. On one trestle 750 ft. long, involving the cutting off of 306 piles, this work was accomplished by two men in two eight-hour days.

We have also found the one-man saw quite effective in sawing timber lagging, as well as for cutting off tunnel lining posts in the application of continuous concrete footings.

The chains on power saws wear quite rapidly and require rather frequent sharpening. Because of this, it is advisable to have a spare chain available to get full use out of the saw. Our experience shows that any saw used for this purpose should have automatic lubrication that is effective in any position.

Raising Track with Power Ballasters

When raising track with a Pullman-Standard Power Ballaster, how should the handling of track jacks be organized? What type of jack is best adapted to this work? How many jacks should be used? Explain.

Uses Only Few Track Jacks

By Engineer Maintenance of Way

To obtain the most effective work with our Pullman-Standard Power Ballasters we now use the following methods of raising the track. These methods have been chosen after considerable experimentation.

Regardless of the extent of the work being done—whether ties are being renewed and/or spaced in addition to out-of-face track raising and tamping, or where merely the latter operation is being performed, with few, if any, crossties being renewed or spaced—the initial raise of 2½ in. or more, as may be desired or required by the size of ballast, should be made to the correct elevation and cross level with a power track jack. The use of a power jack not only speeds up this operation but also materially reduces the number of men required to perform the same operation with track jacks.

Where heavy tie renewals and/or spacing are involved, this work follows the power jack with which the track is raised at each joint or quarter, depending on rail conditions, and a tie at each point of jacking is tamped with ballast forks to hold the track to grade and cross level as the work progresses.

Following the tie gang, and depending on the conditions left by it, four to eight small track jacks are used to bring the rail to true profile and cross level for final tamping with the Pullman Ballaster. In doing this work a sufficient number of ties are tacked by fork tamping to hold the rail in the desired position for tamping with the Ballaster.

This method permits the use of a minimum number of jacks and jack men and has resulted in fewer loose ties back of the Ballaster than we experienced with other methods, and particularly the method involving the use of as many as 24 small jacks to bring the track to true profile and cross level and to hold it in position until it has been tamped by the Ballaster.

Where work is confined primarily to raising and tamping, the initial raise is made with power jacks at joints and quarters, and irregularities between these jacking points are corrected with four small track jacks —a sufficient number of ties being tacked by fork tamping ahead of the Ballaster.

Forty Jacks Do the Trick

By J. R. Scofield
Assistant District Engineer, New York Central, Detroit, Mich.

The method now employed on our railroad has evolved itself over a period of many months of experimentation. Organization is the keynote of success to any attainment which, in this case, has for its object the raising of track an average of three inches and leaving the top of the rail in a new plane of as-near-perfect surface as possible.

In our organization, we find that the use of a power track jack in conjunction with and supplemented with small track jacks, makes for the fastest, smoothest and most economical method of operation. The power jack is operated about three or four rail lengths in advance of the Power Ballaster. It is set so that the foot seats itself between the first two ties in advance of the joint. One man operates the power jack and lifts the track so that the top of rail will be about an inch below the finished grade. Small track jacks are then set under each end of the advance shoulder tie, one man handling each jack. Jack holes have previously been dug by two men ahead. An average of about two notches have to be taken on each small jack to bring the track to final grade. This places the full weight of the track on the small jacks and helps to avoid any settlement that might otherwise take place from the weight of the Power Ballaster, together with tamping vibration. In the meantime, the power jack has been moved ahead a half rail length to the next joint and the operation repeated.

Small jacks are then set on each side of the track at the quarters and are sighted in place by the raising foreman on one side, and by an assistant foreman on the other side. It takes two men on each side of the track to handle, place and operate the quarter jacks efficiently. They may or may not be set at the exact quarter point, depending on conditions.

One man removes the small jacks immediately behind the power ballaster and fills the holes. Two men, one on each side of the track, carry the small jacks ahead and distribute them at the exact locations they are to be used. On double or multiple-track territory a light lorry on an adjacent track can be used effectively for hauling the small jacks ahead.

Too much emphasis cannot be placed on the solid setting of the small jacks. On this depends the entire success of accomplishing good results with a finished top of rail. We have found it necessary, especially on the outside shoulder of double-track territory, to fill in well, and in some cases tamp the stone around the foot of the jack, to assist in avoiding the least settlement or slipping of the jack.

The best type of track jack we have found for this purpose is the "baby" track jack that has a machined toe lift, 2½ in. by 3¼ in. in size, which minimizes or eliminates tie cutting when placed under the end of a tie. We are now ordering for this use aluminum jacks on account of their light weight. Any reduction in weight is quite important because of the amount of necessary carrying.

Forty small jacks, 20 for each side of the track, is about the right number to enable the power jack to keep a sufficient distance ahead of the Power Ballaster to enable the necessary refinement in surface to be accomplished before the Ballaster is ready to tamp the ties.

Foundations for Small Buildings

When small stations or other small buildings must be built on soft ground, what types of foundations can be used? What are their relative advantages?

Best To Take Soil Samples

By L. C. Winkelhaus
Architectural Engineer, Chicago & North Western, Chicago

When using masonry construction in the design of small stations and other small buildings, it is good practice to make soundings so that foundations can be designed to eliminate settlement and resultant damage to the structure.

In most cases, the soil will easily sustain a pressure of more than 3,000 lb. per sq. ft. and the design of a suitable foundation is no problem. However, the use of a nominal amount of steel reinforcement in the footings and foundation walls is well worth the additional cost.

Where soft material is encountered, the footings may be made wider to reduce the soil pressure to approximately 3,000 lb. per sq. ft. It may be necessary to drive piles, or set pile stubs, or bore holes and fill them with concrete—all depending on the depth of the soft material.

In a recently constructed masonry passenger station, the soundings indicated a stratum of peat, approximately six to eight feet in thickness, underlaid with stiff yellow clay. This problem was solved by boring 16-in. diameter holes on 4-ft. centers with a power auger. The holes were then filled with concrete, allowed to set, and reinforced foundations constructed thereon. The results were entirely satisfactory.

Spread Footings or Piles

By W. L. Darden
Engineer of Buildings, Seaboard Air Line, Norfolk, Va.

The terms small stations or other small buildings, and soft ground are, of course, relative, and to give a specific answer to this problem these terms would have to be defined.

However, based on the usually accepted meaning of these terms, I do not think the problem is so difficult when confined to the so-called small buildings. In our work we usually consider that foundation conditions for such buildings are satisfactory if the ground is good for as much as 2 tons per sq. ft. If it is not good for this loading, we either spread the footings or drive piles. If the footings are spread, they, of course, have to be reinforced, as necessary, to take care of bending. If piles are used, they are plain or treated, depending on whether the cut-off is below or above the water line.

Daylight Burning of Headlights

To what extent would the burning of locomotive headlights during the day minimize the hazard to men working on or about tracks? Does the type of headlight make any difference? Explain.

Men Say They Like It

By R. J. Gammie
Chief Engineer, Texas & Pacific, Dallas, Tex.

The increased use of Diesel power in place of steam locomotives, together with the generally higher train speeds that result from Dieselization, have increased the hazards to men operating motor cars or working on or about tracks. The old practice of relying on smoke and noise to give warning of approaching trains is now outmoded. Furthermore, the color designs that are used on most Diesel locomotives act as a camouflage under certain conditions so that it is not as easy to see an approaching Diesel locomotive at a distance as it is a steam engine. In some cases, even steam engines have been dressed up and painted to such an extent that they, too, are not readily discernible. Improved firing regulations and devices have so minimized the smoke from steam locomotives that trackmen can no longer rely on smoke as a warning of approaching trains. Under the best sight conditions, passenger trains operating at speeds of 75 to 80 m.p.h. do not allow much time for the removal of track cars from the track, nor for making the track safe where work is being done.

The use of locomotive headlights during the day, however, greatly increases the visibility of approaching trains. In long stretches of tangent track, it is possible to see the headlight several minutes before the train would otherwise be discernible, particularly, in the case of Diesel locomotives. On a hot summer day when the heat waves above the track limit the view of an approaching train to a mile or less if no headlight is used, an engine with its headlight burning shows up as a blaze of light for many times that distance. Such use of headlights, therefore, gives more timely warning of the approach of a train. Of course, in some instances where curves limit vision, this would not apply to the same extent. Even in these cases, however, a headlight gives a more glaring warning and one that will be more quickly observed.

I do not think the type of headlight used would make a great deal of difference as long as the light is burning brightly. Instructions on this railroad provide for displaying the standard white headlight brightly to the front of every train by day and by night. However, headlights must be dimmed or extinguished when a train stops on a siding clear of a main track or when meeting another train. Under other conditions where track men would be affected, I believe the standard white headlight, burning brightly, is as satisfactory a warning as can be obtained from a light.

Standard Headlight Better

By H. W. Kellogg
Division Engineer, Chesapeake & Ohio, Pere Marquette district, Detroit, Mich.

Before the advent of the Diesel locomotive it was an easy matter for trackmen to detect the approach of a train by the smoke and steam from the locomotive. But during the past few years, the wide use of Diesel power at increased speed has deprived trackmen of the visible signs of the approach of a train that once were a great help to them.

It has been found that a headlight burning brightly on a Diesel locomotive is visible for several miles in daylight and may be seen long before it is possible to see a Diesel locomotive without a burning headlight. For this reason some railroads have adopted, as a safety measure, a rule that the headlight of a Diesel locomotive must be kept lighted at all times while the locomotive is being operated on the road. This has been found to be a great help to men working on or about the tracks.

Many Diesel locomotives are equipped with both a standard headlight and an oscillating headlight. Although the oscillating headlight is an excellent means of calling attention to the approach of a train at night, it is not very effective during daylight hours. In fact, tests have shown that a standard headlight gives a much better warning in the daytime and is visible at a greater distance. For this reason, and also to prevent increased maintenance of the mechanism operating the oscillating headlight, I am in favor of using during the day only the standard headlight, keeping it lighted brightly at all times.

Using City Water for Locomotives

What are the various factors that affect the desirability of using municipal water supplies for heating boilers and for engine cooling on Diesel locomotives? Explain.

A Matter of Economics

By B. W. DeGeer
Engineer Water Service, Great Northern, St. Paul, Minn.

Inasmuch as Diesel power has followed steam power in almost every instance, the general practice, both at terminals and intermediate stations, has been to supply Diesel engines with water from the same source used before their arrival, with such refinements in conditioning as have been deemed necessary. In some cases this has been water obtained from a company supply, and in others it has been water purchased from outside parties, but, in any case, it is assumed to be the most desirable and economical water obtainable.

As long as both types of power are used on the same district this works out very well. But when only Diesel power remains, which requires much less water than steam, it may prove less expensive to pay what seem to be rather high rates for city water, than to continue to operate a company pumping plant, if the quality of the water from both sources is comparable.

The whole thing is a matter of economics, which must include cost of conditioning the water for Diesel use. If the cost of adequately conditioned water from a municipal supply is comparable to the cost of producing similar water with company facilities, it is generally desirable to resort to the use of city water, and abandon the company supply.

Must Make Many Comparisons

By E. R. Schlaf
Assistant Superintendent Water Service, Illinois Central, Chicago

The usual pressure carried in railroad mains supplying water columns is approximately 20 lb. Municipal mains usually carry pressures greatly in excess of this. If the municipal water is of such chemical quality that it can be fed directly to the locomotive from the mains, the saving in time on servicing through trains is apparent. Of course, static pressure alone is not the only consideration so far as delivery is concerned. Adequate-size piping to the point of delivery is imperative or friction losses will overcome the advantage due to any increase in main pressure.

From a chemical standpoint various comparisons should be made to determine which water is better suited for the job. For example, it has been found that an excessive chloride content of the water used for engine cooling purposes tends to aggravate corrosion. Excessive doses of chromate treatment can be used to reduce this tendency but do not completely eliminate the trouble. Thus the water that is lower in chlorides is more desirable for engine cooling purposes.

Another consideration is that of hardness, both temporary and permanent. If scale-forming materials are present, the comparative costs and method of treatment of each water should be determined. In some cases alkaline-organic treatment is all that is required. In other cases, zeolite treatment, followed by organic, is necessary. Complete demineralization, supplemented by a light dose of alkaline-organic, gives excellent results.

The pH value of each water should be compared but, generally speaking, pH can be corrected easily if not already within safe limits. Silica can be troublesome provided binding scale-formers are also present. Special resins for deionizers are now available to control silica troubles. Total-dissolved solids content of each water should also be compared.

Comparative costs of each water per gallon at the point of delivery should be computed. These costs, considered along with chemical quality and speed of delivery, should provide an indication as to which of the two sources of water is the more desirable.

Installing Corrugated Roofing

To what extent are welded fasteners adaptable to the installation of corrugated roofing and siding on railway buildings? For what other building purposes may these fasteners be used? Explain.

Lower Installation Cost

By Robert C. Friedly
Central States Regional Manager, Nelson Stud Welding Division of Morton Gregory Corporation, Chicago

New freight and passenger stations embodying special architectural treatment of corrugated materials are made possible through the use of welded fasteners. Repair of existing, and construction of new, passenger loading platforms and freight docks, are being accomplished at lower cost through the use of such fasteners.

Welded fasteners for corrugated roofing and siding materials permit the securing of these materials from the exterior, or top side, of the building. This type of installation on new buildings speeds up completion by eliminating interior scaffolding and labor, thus permitting free access to the building by other trades. Where structures already exist, it is now possible for normal work operations to be continued while the building is being re-roofed or re-sided.

Prefabricated buildings are quite often furnished with welded fasteners already applied to the steel framework, thus enabling the railroad to erect, by its own forces, buildings of this type. Extensive preparations for the positioning of welded fasteners by untrained crews is not required in installations of this type.

In addition to the use of welded fasteners to secure corrugated roofing and siding, they are also avail-

able for the installation of electrical systems, process piping and automatic sprinkler systems, asbestos-cement covered insulating board, insulating material, etc. The low cost features of welded fasteners are as advantageous as other fasteners for corrugated materials.

Spraying Weed-Killing Chemicals

When is the best time to spray the right-of-way with chemicals to control weeds and woody plants? What factors are involved? Explain.

Spray at Four-Inch Height

By B. S. Converse
Division Engineer, Chicago & North Western, Sioux City, Iowa

The question as to when is the best time to spray the right-of-way to destroy weeds and woody plants cannot be answered by a general statement of fact as there are many factors which enter into the problem. The proper time to spray will depend on the type of herbicide used, the purpose of spraying the right-of-way, the type of weeds which predominate, state laws, and weather conditions.

Herbicides may be grouped into two general types, non-selective and selective. The non-selective herbicides, for the most part, are contact killers which obtain their effect by cauterizing the top growth of plants or by temporarily sterilizing the soil. This group includes, among others, sodium chlorate, Atlacide, ammate, borax, and TCA. Selective weed killers, insofar as their use on a right-of-way is concerned, are effective on broad-leaf weeds and brush while harmless to the various grasses. The chemicals 2,4-D and 2,4,5-T in their various forms are included in this classification. These materials are growth-regulating hormones which have a toxic effect, resulting in death of the plant.

It would appear that the non-selective weed killers may be used at any time or at any stage of plant growth, remembering that a larger quantity of chemical is required to be effective upon a dense growth of foliage than would be otherwise necessary.

Present thinking indicates that the various formulations of 2,4-D (Dichlorophenoxyacetic acid) are the most satisfactory for right-of-way spraying because of their relatively low cost and their selective quality which permits the replacement of weeds with desirable grasses. This material is now being extensively used by public bodies for spraying county road and state highway rights-of-way. Results obtained through the use of this chemical indicate that, although some effect on plants is noted throughout the entire growing season, there are very definite stages of growth when various plants are most susceptible to the poison. It would appear that all weeds are most susceptible when in the early growth stages and when growing vigorously. It has been noted that some weeds which become resistant with age can be killed easily when they are young, and weeds which have been subjected to late spring frost or have gone through a period of drought or are covered with dust, are much harder to kill with 2,4-D than when they are growing fast and have plenty of moisture and nutrients available. In general then, we may say that weeds are most susceptible to 2,4-D poisoning when they are young, well leafed out and actively growing.

Although the above statement indicates the proper time to spray a given plant with 2,4-D for maximum destructive effect with a minimum of chemical, it does not tell us when we should spray a large area, such as a mile of right-of-way on which is growing many types of plants, each of which has reached a different stage of growth on a given calendar date. Some early weeds may be in the bud stage by the time the later ones are well leafed out. An example of an early weed is dock, which frequently goes to seed during the fore part of June. Also, it is now found that it is desirable to spray a few weeds during the bud stage, which might occur in midsummer. Field bindweed or creeping jenny is a weed in this category. It is recommended that, for maximum control, this plant be sprayed just as it is coming into bloom. Consideration must also be given to the fact that after a weed has gone to seed the harm has been done. Spraying after this has occurred serves no purpose.

Brush may be sprayed any time after it has leafed out thoroughly. Spraying too soon will result in defoliation without obtaining a permanent effect.

From the above it may be deduced that a single general spray operation on the right-of-way will not result in maximum control of all weeds, or, in the case of one specific weed or another, any control at all. It would seem, then, that the best time to choose is that which will result in destruction of the maximum number of varieties. If one type predominates on the right-of-way, or for reason of a state law or other purpose it is desired to destroy a particular species, the spraying should be done during that particular plant's susceptible stage.

In general, I believe the most satisfactory results will be obtained by starting the spray operation when growth on the right-of-way has reached a height of four to six inches. Good control will be obtained on most of the weeds during this growth period, which includes the rosette stage of the perennials, and the foliage will be such that a minimum amount of solution will be required. If further control of specific varieties is necessary at a later date, it may be done by a spot operation.

Many Factors Involved

By L. J. Gilmore
General Roadmaster, Great Northern, Spokane, Wash.

There are two main factors involved in this subject. These are (1) the amount of rainfall, and (2) the types of vegetation, i.e., shallow rooted annuals and deep rooted perennials. There are also two areas on the right-of-way on which weeds must be controlled in different degrees. These are the track area and the off-track area.

A high rainfall area, such as that west of the Cascade mountains, necessitates application of chemicals in the early spring, usually from late March to early May. This takes advantage of the precipitation, which on the average will be sufficient to move chemicals such as Chlorax and Atlacide into the root zone and kill the plants. Applications during fall and winter months will generally be lost, because of the heavy rainfall leaching the chemical out of the soil too rapidly. If applied too late in the spring or throughout the summer in this area, the rainfall is so light that the chemical remains on the soil surface and does not affect the roots of the plants.

In areas east of the Cascades, where rainfall is lower and generally occurs through the winter months or early spring, the best time of application is in the early spring just as soon as growth starts. This will con-

trol both annual and biennial shallow-rooted species. Where deep-rooted perennials occur, such as morning glory, canada thistle, knapweed and brush, treatments are more effective in this area if applied in the fall. This can be accomplished readily, as these perennial plants usually grow in patches of limited size, and frequently occur in the off-track area and can be spot treated with chemicals similar to Chlorax liquid, Atlacide spray powder or Atlacide liquid. These are soil sterilizing chemicals and their use will build up a soil sterility which not only kills the root system of weed plants, but which will prevent their re-infestation by seedling growth. This is particularly desirable for treating the track area. It is also frequently desirable for the treating of noxious weed patches that are growing on the right-of-way.

Woody plants can also be killed by thoroughly spraying at the times designated above. Practically all woody plants are perennials with deep root systems. Variations as to growth habits make some species more readily killed with chemicals than others. Several species of woody plants, particularly when they are growing in wet soil locations or soils with high water tables, can be successfully controlled by spraying with an ester of 2,4-D and 2,4,5-T. These last named chemicals should be used with caution along the right-of-way as they are volatile and may injure susceptible crop plants growing adjacent to the right-of-way.

Varying Conditions Govern

By F. H. McKenney
District Engineer Maintenance of Way, Chicago, Burlington & Quincy, Omaha, Neb.

The control of weeds and brush on railroad rights-of-way is a very important problem, since the high cost of labor has made it almost impossible to continue old hand methods of mowing and cutting.

The use of chemicals developed during the past few years promises some help in the solution of this problem, but in most cases the results are extremely variable and often unsatisfactory. For a good many years arsenical chemicals and sodium chlorate mixtures have been used to control weeds in the track section. New chemicals containing various 2,4-D compounds are now available at a cost that makes them attractive for controlling weeds and brush outside of the track section. This discussion pertains to the use of some of the newer 2,4-D compounds.

Many factors enter into the effectiveness of chemicals in killing weeds and brush, such as the condition of growth, temperature, humidity, and ability of different plants to resist the chemical. Most species of broad-leafed annual weeds show some susceptibility to 2,4-D, especially in the early stages of growth, and with the exception of a few species, control of the broad-leafed plants can be accomplished by timely sprays of 2,4-D. Some of the more resistant varieties require more than one spray per year. The total number of sprays for complete eradication is dependent, as stated above, on species, soil moisture, soil type, and condition of growth when spraying is done, making it impossible to state the number of treatments required for eradication in any particular area. Temperature at the time of application is also important. With temperatures of 40 to 60 deg. the reaction may slow up to a point where the plant may recover and, likewise, with temperatures of 85 to 90 deg. the action may be too fast on the tops and result in failure to kill the roots. The best conditions for killing annual weeds with 2,4-D compounds is in the spring when most rapid growth is occurring, and up to the time the plants are blooming. In the spring and sometimes again in the fall are good times to treat perennial plants.

Many new compounds are being brought out and it is desirable to give consideration to the selection of a chemical that will give the best results.

Spray During June and July

By E. P. Sylwester
Plant Pathologist and Botanist, Iowa State Extension Service, Ames, Iowa.

It is, of course, impossible to discuss chemical weed control even in a brief way in a short note of this kind. There are several types of chemicals which have merit for the control of weeds and brush in fencerows, ditch banks, roadsides, railroad rights-of-way, etc. All of these chemicals have some good points; all of them have some bad characteristics. There are such materials as sodium chlorate, Atlacide, Ammate, contact sprays, borax, 2,4-D and 2,4,5-T, all of which might have application for certain specific tasks and instances. However, due to poisonous quality, corrosiveness, inflammability, total soil sterilizing effect, etc., as well as cost, only certain chemicals may have widespread use in chemical weed control, especially in areas where it is desirable to save the grassy plants. With the advent of 2,4-D and lately of 2,4,5-T, owners of land subject to brushy and weedy growth can look forward to much easier control of these weedy pests by means of these chemicals, both of which seem to have great possibilities.

On most brushy and weedy plants it is necessary to have sufficient green growth present on the plants before spraying is undertaken in order to get translocation of the material into the leaves, stems, and possibly roots. Both 2,4-D and 2,4,5-T, and mixtures of the two, especially the ester mixtures, can be applied during June and July, generally speaking, with good effects. There may be some types of weeds or brush which are resistant to these chemicals. We have generally recommended that for spraying where the primary undercover is grass, approximately a pound to a pound and a half of these active ingredients be used per acre. This, in terms of concentrate, usually amounts to approximately a quart to a quart and a half of concentrate per acre in as much water as it takes to cover the brush or weeds in that area. It is possible to spray too early, that is, when the leaves are still in the process of unfolding. Although it is true that the leaves on the weeds and the brush at that time are very tender, it has been found that very early spraying often results in quick defoliation without permanent kills. Consequently, it is best to delay spraying until the weeds and brush have a relatively large amount of leaf surface on them, but at the same time the spraying should be done early enough before the plants become old and tough. It is cheaper, of course, to spray using 2,4-D or mixtures of 2,4,5-T and 2,4-D in water. However, on more resistant plants and under certain conditions, it has been found advisable to use ester mixtures dissolved in oil.

Most of the trials with 2,4-D and 2,4,5-T have been concerned primarily with foliage spraying. There is also a new field opening up whereby the brush is eliminated during the off seasons of the year and the stumps sprayed with a concentrated material embodying 2,4-D and 2,4,5-T. This method has also shown a great deal of promise. Undoubtedly it will be used more extensively in the future than it has been in the past.

PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices

(For additional information on any of the products described in these columns, use postcards, page 947)

HYDRAULIC LIFT AND ATTACHMENTS GIVE JEEPS WIDE VERSATILITY

JEEPS, equipped with a hydraulic lift and designed for a wide range of maintenance-of-way operations through a series of mounted or towed attachments, are being introduced into the railway field by the Monroe Auto Equipment Company, Monroe, Mich., following their effective application to many farm jobs, such as plowing, disking, harrowing, cultivating, sawing timber, and as a general farm-purpose vehicle. The Monroe hydraulic lift, with two lifting arms, is mounted on the rear of the jeep, and, by connecting various implements to these arms, the unit as a whole can be used in such railroad maintenance operations as moving and setting replacement rails; lifting and transporting switch ties and bridge timbers; mowing and spraying weeds and brush; plowing and disking for firebreaks along the right-of-way; scooping, scraping, carrying and finishing earthwork; plowing off ballast shoulders in tie renewals or reballasting operations; digging post holes, and any one of a variety of other operations involving power hand tools. Furthermore, the jeep provides cushioned seats for the driver and one man, and can be equipped with auxiliary seats.

The various implements making possible the foregoing operations include a sickle-type mower, post hole digger, hydro-grading scoop, grader and terracer, bucket-type scraper, ballast shoulder plow, firebreak plow, weed sprayer and fire pump, and a short lifting and carrying boom. The jeep is also equipped with a rear power take-off, and can be fitted with a portable compressor or generator to permit spot tie tamping, welding, and the operation of a wide variety of power hand tools.

The jeep has a low center of gravity so that it may be worked on hillsides without danger of overturning, even when the front wheels are cramped sharply. It is equipped with four 7-in. pneumatic-tired wheels to afford good traction, and has a four-wheel drive, which enables it to traverse terrain that might be impassable to conventional pneumatic-tired equipment.

The key to the jeep's versatility is the hydraulic lift, mounted on the rear, which consists of a main housing, cylinder and lift assemblies; a hydraulic pump assembly with oil tank, and necessary valves and hydraulic fluid lines. The main housing is attached by three cap screws to the rear floor of the jeep and can be quickly removed in the event that this portion of the vehicle is desired for more carrying space. The hydraulic pump is attached to the jeep engine, from which it receives its power, while a fluid supply tank and valve assembly are located between the two front seats.

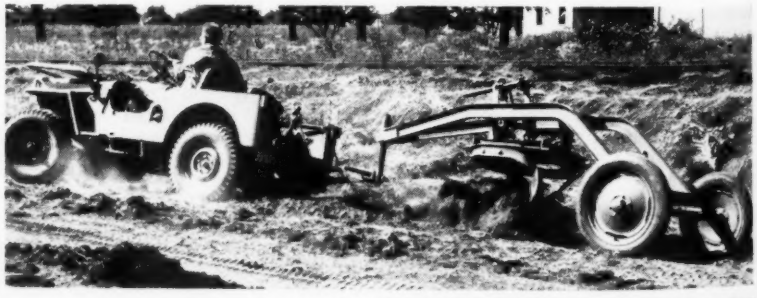
With this arrangement, only one operator is required, who steers the vehicle with his left hand while he controls the raising and lowering of the hydraulic lift arms by a lever. If the ground is very hard where the jeep is working, more weight can be added to the implement being towed by turning a down-pressure control valve, adding up to 500 lb. of the weight of the jeep to the tool.

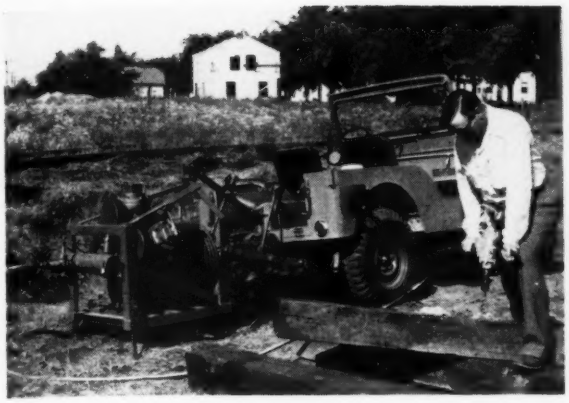
The two arms and connecting link of the hydraulic lift have self-alining bearings to give proper alinement and movement to the connected implement, and the three-point hitch gives complete control over its position at all times. The implements are attached to the lift arms by means of link connections. One of the arms has a leveling control, the crank of which is within reach of the operator, so that the angle of the implement can be changed up to nine degrees without the necessity of the driver leaving his seat.

One of the important uses for the hydraulic-lift-equipped jeep is for

Note—All of the accompanying photographs were taken during a demonstration recently before a large number of railway men, at the company's plant at Monroe, Mich.

Left—Attached to the hydraulic lift of the jeep, two released rails are here being easily pulled across the track and out of the way. Below—A jeep with grader-and-terracer unit forming a roadway with side ditches





Left—Using a wood borer powered by Ingersoll-Rand 60-cfm. air compressor. The compressor is carried by the hydraulic lift and is powered by the rear power take-off on the vehicle. Right—The furrow and ridges, quickly made by this firebreak plow, form a fire break from 4 to 6 ft. or more wide

transporting relief or repair rails to any point along a rail line, eliminating the usual lifting which requires a considerable force of men. In handling a relief rail, a bar and chain are attached to the hydraulic lift and the opposite end of the chain is attached to the rail by means of a clevis and

This view shows how the ballast shoulder plow can cut away the material at the ends of the ties to facilitate tie renewals. When turned, this unit can plow the material back against the tie ends

pin at one of the bolt holes. So attached, the hydraulic lift arms raise the rail end and hold it in position to permit dragging the rail down the track or right-of-way, by the jeep, for any distance desired.

The sickle mower attachment available for operation by the jeep has a heavy-duty cutter-bar which will cut a swath six feet wide. Mounted at the rear of the jeep, and connected to the rear power take-off, this equipment can mow either along the track shoulder or out on the right-of-way, and is said to be capable of cutting brush and saplings up to an inch or more in diameter. A feature of the sickle bar is that it is equipped with a safety release, whereby, if the bar runs into an obstruction, it swings back parallel with the machine, without damage.

The post-hole diggers for use with the jeep are available in diameters of six, eight, ten, and twelve inch, and in the form of a special tree-hole auger, 18 in. in diameter. These diggers are mounted on the lifting arms of the hydraulic lift and are connected to the power take-off by means of a telescoping drive shaft. Adjustments can be made to place the auger at an angle for side-hill boring through a pendulum action which allows a movement of about 15 deg. in any direction. Demonstrations have shown that with the 10-in. auger, for example, holes can be dug to a depth of three feet at the rate of about 20 sec. each.

The digger throws the earth close to the hole where it is easily reached for backfilling and tamping. Where hard-pan, shale or sandstone are encountered, the down-pressure control valve gives 500 lb. added weight to the auger, and the bit can be reversed, as necessary, to prevent its clogging or sticking in the ground. It is pointed out that, in addition to using this equipment for digging fence post holes, it can also be used to advantage for starting holes for poles, the additional depth required being dug in the usual manner with hand augers.

The various towed earthwork units available with the jeep are all connected to the hydraulic lift when in action, and are designed for one-man operation from the driver's seat. It is said that this equipment can be used effectively for cleaning ditches, making dikes, shaping cut slopes, forming embankments and motor-car set-offs, building and conditioning roads and driveways, disposing of snow, improving visibility at highway crossings, smoothing the right-of-way for the operation of off-track equipment, general excavating, constructing firebreaks, and a variety of other earthwork operations where the use of larger, more expensive equipment may not be practicable.

One of the attachments, known as the hydro grading scoop, carries 6 cu. ft. of earth and can be raised and lowered at will, and dumped by means of a trip rope within reach of the operator while the jeep moves forward or backward or is standing still. The scoop can be reversed in its mounting to place the cutting edge to the rear whenever it is desired to use it for backfilling operations. A leveler blade 6 ft. wide, is also available for smoothing ground that has been roughened by grading operations, as is also a lift-type terracing blade. The latter blade, which is 6 ft. long and 12 in. high, can be raised, lowered and tilted at will by means of the hydraulic lift, and locked in any position desired.

The two-wheeled grader-and-terracer unit, which is used for roadway and side ditch work, has an 8-ft. steel blade, with a detachable cutting edge, and is suspended from an I-beam frame mounted ahead of the pneumatic-tired wheels. With a hitch on the hydraulic lift, this unit can be raised and lowered at will by the driver of the vehicle. A special feature of this unit is that it is equipped with a circle assembly over the blade so that the blade angle can be changed as much as 45 deg. in either direction laterally, swung about 30 deg. vertically, and the pitch of the cutting edge varied.

The all-purpose earth mover is a bucket-type scraper of 1 cu. yd. capacity, mounted on four pneumatic-tired wheels, and connected to the hydraulic lift. After the scraper

For additional information on any of the products exhibited on these pages, use postcards, page 947.

Spraying vegetation along the right-of-way with a weed sprayer. Turning the nozzle will vary the discharge from a fine mist to a stream 30 ft. long

is loaded, the two front wheels are lifted from the ground by the hydraulic lift for easier towing, providing an 8-in. under clearance for the bucket. The front wheels are adjustable in height so that the cutting depth can be controlled, and take the brunt of the downward cutting action while the bucket is being loaded, which would otherwise be transmitted to the jeep. The loading, dumping and spreading operations are all performed by the driver from his seat. The cutting blade of the scraper is reversible and cuts a five-foot width.

The ballast shoulder plow is designed to remove the shoulder ballast from the ends of the crossties to assist in making tie renewals. This unit consists of a moldboard plow, positioned so that it crowds the ends of the ties, and is supported on a pneumatic-tired wheel. A small disk wheel behind the plow acts as a guide along the face of the cut to prevent the plow from striking the tie ends. After tie renewals have been completed, the machine can be turned around and the ballast plowed back into place to form the normal shoulder.

The compressor designed for use with the jeep is a 60 cfm. portable unit, which is mounted in a frame at the rear of the jeep. This compressor is powered by the rear power take-off of the jeep and can be used for operating a wide range of air tools, including tie tampers, spike drivers, grinders, wood borers, impact wrenches for driving screw spikes or tightening bolts, power saws, etc.

The boom attachment for the jeep is 6 ft. long and has two loading rings, one at the extreme end and the other approximately at its midpoint. Loads are attached by means of a chain sling, and are lifted and lowered by the raising and lowering of the boom by the hydraulic lift.

The firebreak plow—a unit which is said to have become very popular with forest fire fighters, especially because of the speed with which it can be brought to the scene of action—consists of a middle-buster point with a free-revolving disk on each side, preceded by a coulter wheel. The coulter wheel cuts the sod ahead of the plow point, and the wide shares and disks produce a wide furrow and earth ridges, which together form a firebreak from 4 to 6 ft. wide, depending upon soil conditions.

The weed sprayer and fire-extinguishing equipment available for use with the jeep consists of a 100-gal. tank, a water pump, and a 25-ft. hose line equipped with a nozzle. In operation, the tank is not under air pressure as the pump draws the water from the tank and pumps it directly into the hose line. The nozzle can be instantly adjusted to produce either a fine mist or a stream 30 ft. long. This unit requires the services of two men, one to drive the jeep and the other to operate the nozzle.

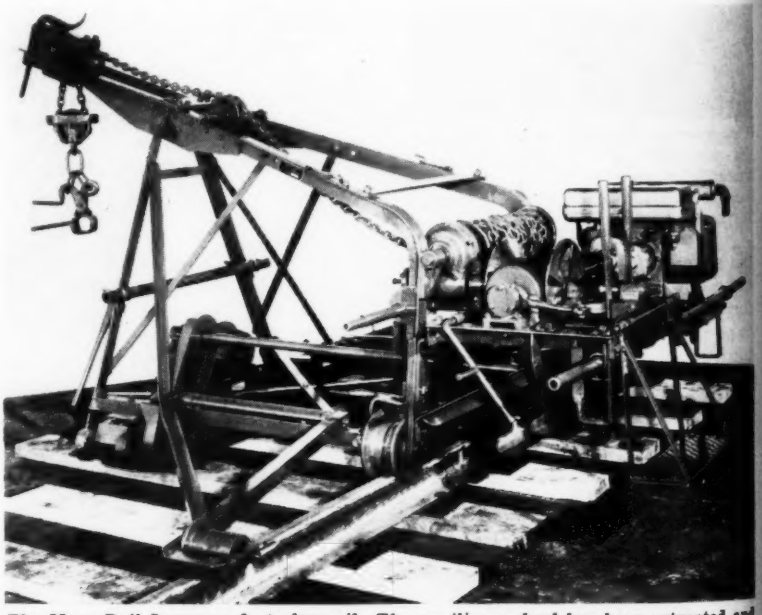
IMPROVED MECO RAIL LAYER

THE Maintenance Equipment Company, Chicago, has announced that a number of improvements have been incorporated in its Meco Power Rail Layer. The improved machine, known as the Type C Meco Power Rail Layer, is self-propelled while engaged in laying rail, eliminating the need of pushing it by hand as each rail is laid. Also, the auxiliary rail used in previous models for heeling the new rails into position is no longer needed.

Essentially, the Meco Rail Layer consists of a fixed boom, the pulley end of which extends outward from the track on the side to be relaid, and the operating machinery which rests on a cantilevered platform on the opposite side of the track, all mounted on a frame with two flanged wheels on the machinery side and an auxiliary flanged wheel and a crawler mechanism on the boom side. Power is furnished by a 10-hp., 2-cylinder, 4-cycle, air-cooled engine.

In moving the machine to and from the job, the auxiliary wheel is lowered and the unit is towed by a track motor car. When ready to lay rail the auxiliary wheel is retracted, placing the weight of the boom side of the machine on a crawler track which runs on top of the ties, the outriggers and operator's platform are swung down into working position, and a rail grip is applied to the running rail. Then, by means of a tong applied at its center, the rail to be laid is hoisted about a foot above the ties, after which the operator strikes a trip trigger, causing a carriage to roll down the boom to a position that

(*Continued on page 992*)



The Meco Rail Layer ready to lay rail. The auxiliary wheel has been retracted and the outriggers and operator's platform swung down into working position. In this view the cover has been removed from the friction drive mechanism

The Verona *Fixed* Tension Triflex Springs.

Why is it the world's finest Spring Washer?

BECAUSE it will not go flat before reaching a practicable and workable bolt tension.

BECAUSE it does not leave to chance the important factor of *equal* tension to all bolts.

BECAUSE it has the highest reactive pressure of any spring washer on the market.

The world's Finest Spring Washer is the . . .

VERONA *Fixed* TENSION TRIFLEX SPRING

We also make a complete line of alloy coil washers to A.R.E.A. 1948 requirements.

WOODINGS VERONA TOOL WORKS

VERONA, PA. — CHICAGO, ILL.

For additional information on any of the products exhibited on these pages, use postcards, page 947.

brings the hoisted rail inward to gage position. The operator next moves the rail layer longitudinally by the crawler mechanism to bring the rail to its correct longitudinal position. Finally the rail is lowered onto the tie plates. All of these operations are controlled by two levers engaging roller frictions.

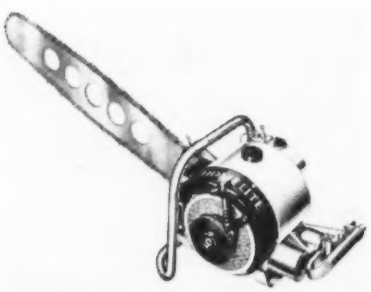
Laying rail with the machine normally requires a crew of four men—the operator, one man for the tongs and two rail-end men. This crew can also readily move the machine to the opposite rail, across the intertrack space or set it off the track to clear for traffic by means of the Meco set-off and transfer device which is carried on hangers under the engine platform when not in use.

The rail layer is said to be capable of laying rails at the rate of one or more per minute and can thus keep up with a mechanized rail gang of 120 men. It can also be used profitably with small gangs of 15 or 20 men because of its low operating costs and ease of operation. The machine readily lays rail on bridges and in tunnels.

NEW LINE OF HOMELITE CHAIN SAWS

THE Homelite Corporation, Port Chester, N.Y., has announced a new line of one-man gasoline-engine-driven chain saws featuring a complete saw weighing only 33 lb. Lightweight has been achieved by using die-cast magnesium and aluminum alloys for all major casting in both the engine and saw. The Homelite engine has been kept to a minimum size by a compact design, with cylinder, magneto and drive housing mounted directly on the crankcase. Ball and roller bearings are used throughout the engine.

The Homelite chain, chrome-plated and easily sharpened, has a narrow kerf and simple design for fast cutting and reduced drag. The complete line of saws include straight blade units in 14-in., 20-in., 27-in. and 30-in. sizes, and a non-binding bow saw.



One of the new Homelite one-man gasoline-engine-driven chain saws

SPRING WASHER FOR FROGS AND CROSSINGS

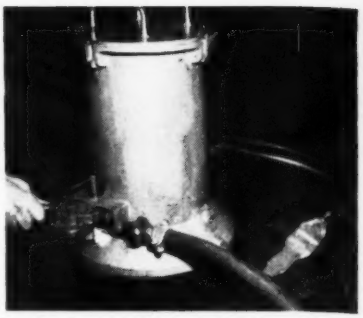
THE Eaton Manufacturing Company, Reliance Division, Massillon, Ohio, is offering an improved frog and crossing Hy-Crome spring washer designed to eliminate frog and crossing failures due to bolts that have become loose due to wear. It is made to withstand severe stresses and to provide sufficient reactive pressure and range of reaction to keep bolted assembles under tension.

The improved frog and crossing Hy-Crome spring washer

The features of the washer include a wide section to provide a full bearing surface for wide nuts, and beveled ends to prevent damage to bolted surfaces when applying or re-applying the washer. It is available in four bolt sizes: 1⅛ in., 1¼ in., 1⅜ in. and 1½ in.

INJECTOR FOR BRIDGE SEAT REPAIRS

THE Nu-West Machine Products Company, Cleveland, Ohio, has announced that it is now manufacturing a device for injecting Rust Joint Iron under the masonry plates of steel bridges. This device embodies the basic design of a unit originally developed on the Erie, which was described in the July, 1948, issue of *Railway Engineering and Maintenance*. With this device repairs to bridge seats can be made without raising the bridge more than an inch, thereby permitting the work to be carried out with minimum interruption to traffic.



The Nu-West Rust Joint Iron Injector embodies the basic design of the tested Erie unit

The Nu-West injector consists of a body made of a single aluminum casting with separate chambers for water and iron, a coupling to which an air-line is attached (air pressure 60 lb. to 90 lb.), a vaporizor, operating valves, and the injecting nozzle in which water vapor and iron are mixed in correct proportions. It also incorporates a heating chamber in which a heating torch may be inserted if steam is desired in the winter to facilitate oxidation of the iron. The capacity of the water chamber is 1½ gal. and that of the Rust Joint Iron chamber is 100 lb.

In using this device to repair bridge seats the masonry plates or pedestals are first raised to the desired elevation and the opening underneath caulked on three sides with oakum or similar materials. Then the nozzle is pointed at the opening and Rust Joint Iron combined with water vapor is injected until the cavity is filled flush with the edge of the plate. Finally, the caulking is removed, and the iron is painted with an asphalt base paint after it has thoroughly oxidized.

CHLORAX SPRAY POWDER

THE Chipman Chemical Company, Bound Brook, N.J., is offering a chemical weed killer, known as Clorax Spray Powder, for use in locations where weeds create a fire hazard, such as in the vicinity of tie and timber storage yards, oil tanks and wood bridges. It is a non-separating composition of sodium chlorate and a special form of borate, which can be applied in its original dry form or dissolved in water for use as a spray.

Designed to kill practically all

(*Continued on page* 994)

JACKSON 4 Tamper OUTFITS

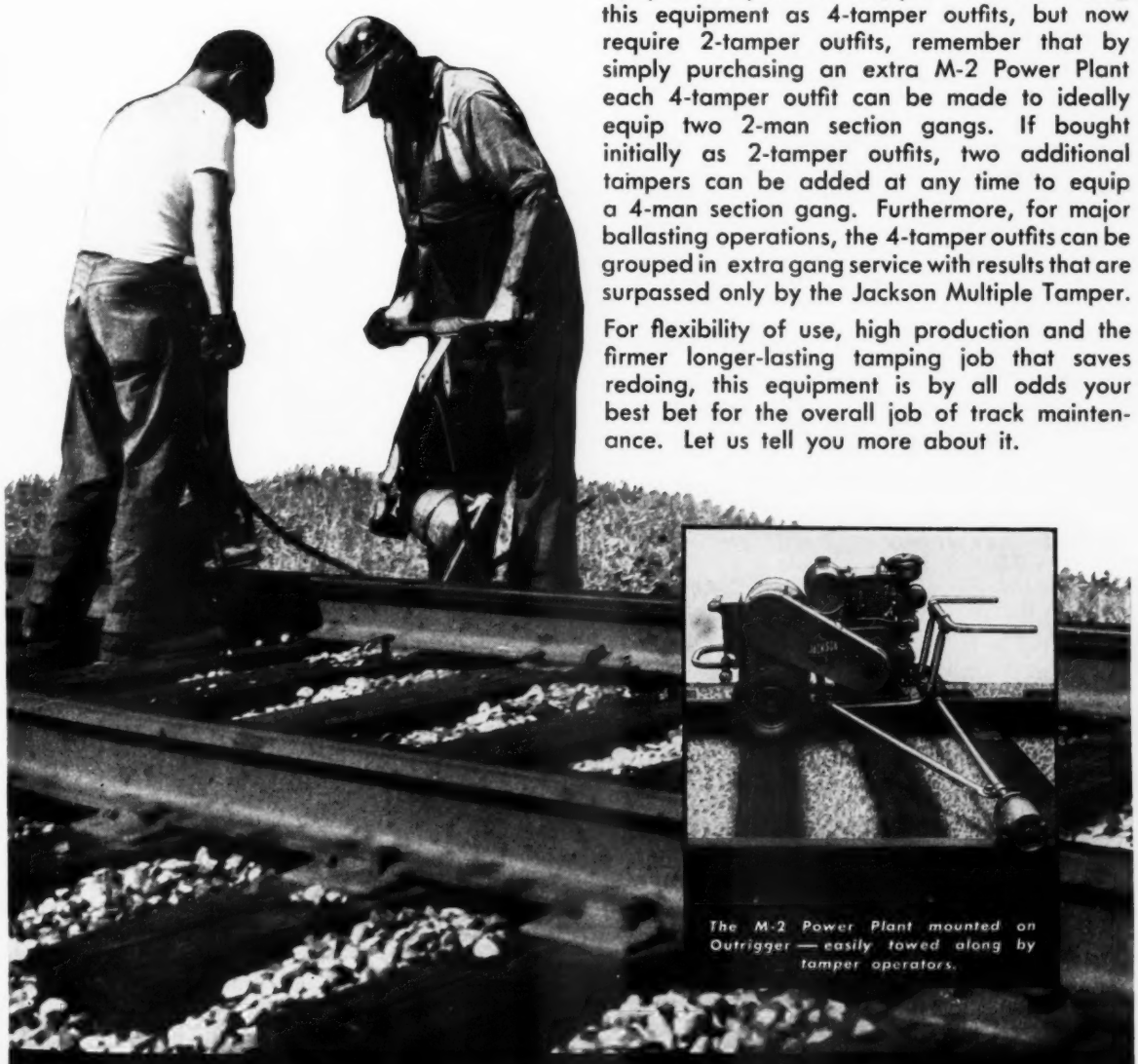
are also IDEAL For 2-MAN SECTION GANGS

TOPS FOR EXTRA GANG SERVICE, TOO!

In the reorganization of track maintenance crews to beat the 40-hour week, don't overlook the fact that with the Jackson M-2 Power Plant, which operates 1 to 4 Jackson tampers, you have the perfect nucleus for achieving the ideal tamping combination for either 2 or 4-man section gangs and extra gang service as well.

If, up to the present time, you have been using this equipment as 4-tamper outfits, but now require 2-tamper outfits, remember that by simply purchasing an extra M-2 Power Plant each 4-tamper outfit can be made to ideally equip two 2-man section gangs. If bought initially as 2-tamper outfits, two additional tampers can be added at any time to equip a 4-man section gang. Furthermore, for major ballasting operations, the 4-tamper outfits can be grouped in extra gang service with results that are surpassed only by the Jackson Multiple Tamper.

For flexibility of use, high production and the firmer longer-lasting tamping job that saves redoing, this equipment is by all odds your best bet for the overall job of track maintenance. Let us tell you more about it.



The M-2 Power Plant mounted on Outrigger — easily towed along by tamper operators.

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Mich.

For additional information on any of the products exhibited on these pages, use postcards, page 947.

types of vegetation, Clorax Spray Powder also provides a residual effect in the soil which substantially discourages regrowth. Not only is it reported to create no fire hazard in spite of its chlorate content, but also to actually retard burning. The product is not poisonous to animals when used as directed.

MORE POWER FOR TWO I. H. TRACTORS

THE International Harvester Company, Chicago, has announced improved "A" models of the International TD-18 and TD-14 Diesel crawler tractors, which have greater work capacities than previous models and incorporate a number of new features designed for increased operator comfort and longer trouble-free service.

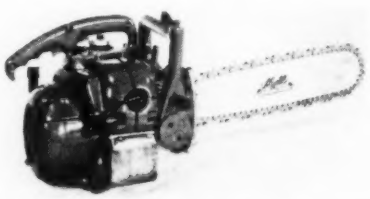
In the TD-18A the horsepower at the drawbar has been increased from 80.5 to 87, at the flywheel from 97 to 107 and at the belt from 91.5 to 101. Its drawbar pull is 22,400 lb. in first gear. The drawbar has been strengthened by welding, in addition to riveting, and 20-in. shoes have been applied for improved traction. This model has six speeds forward, to a high of 5.7 m.p.h., and two in reverse, up to 3.5 m.p.h. In the TD-14A the horsepower has been increased to 76 at the engine flywheel, 60.5 at the drawbar, and 72 at the belt. Its maximum drawbar pull is 16,600 lb. The TD-14A has the same speeds as the TD-18A.

Both tractors feature spring boosters on the steering-clutch hand levers for greater ease of operation; a closed cooling system which prevents loss of coolant when the tractor is working on a steep grade; and improved lubricating oil filters which are said to extend the usual oil-change period.

Other newly-designed parts include crown-shaved transmission and final drive gears; spiral bevel gears; improved engine clutch hand levers; bonded clutch facings; dowell bolts in sprocket gears; split-type steering clutch couplings; positive lock on transmission gear shifts to prevent gear "pop-out" under heavy going; and a glass water trap in the Diesel fuel system to permit quick visual inspection.

NEW UNITS ADDED TO CHAIN-SAW LINE

THE Mall Tool Company, Chicago, has added six new models to the Mall line of power chain saws, increasing the line to a total of 10 different units. These include one and two-man models with gasoline engine, electric or pneumatic drive. In addition the four existing models have been improved. The feature of the line is an electric chain saw designed for one-hand used.

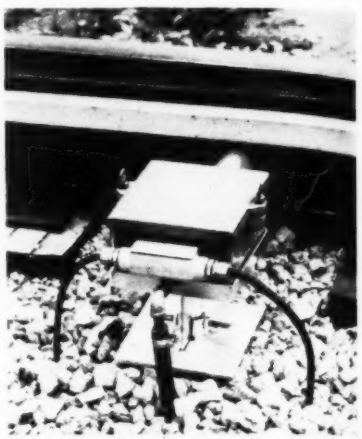


The Model 12 gasoline engine chain saw —one of the six new units added to the Mall chain-saw line

The International TD-18A has a greater work capacity than previous models

REMOTE CONTROL FOR WHITE SWITCH HEATERS

THE White Manufacturing Company, Elkhart, Ind., is now offering remote control for automatically lighting and keeping lit White switch heaters at any distance from a control station. The remote control apparatus consists of two self-contained units per switch, each enclosed in a water-tight box with an igniter tube extending under the switch heater at any place in its length. Each box contains a gas regulator for a pilot light and a thermostatic switch connected to a thermocouple. The outer end of the igniter tube contains an ignition coil, thermocouple and gas jet.

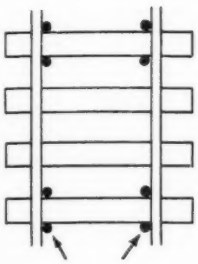


The White remote control apparatus for automatically lighting and keeping lit White switch heaters

At each location, for one switch or several, the gas flow is controlled by a solenoid-actuated gas valve which is connected to a three-wire circuit leading from the control box to the power source. The solenoid valve operates on 12-volt current. It can be furnished for operation on a 110-volt circuit if desired.

When the operator at the control station moves a small contactor, the valve at each heater location opens the gas supply, the igniter coils of the control apparatus become incandescent; and in about 20 seconds gas is lighted in the switch heaters. When the thermocouple becomes sufficiently warm, it automatically breaks the igniter circuit and closes a circuit which lights a lamp at the control station, showing that heaters are operating. If the heater extinguishes for any reason, the thermocouple cools, turns off the indicator lamp and turns on the igniter again. Thus the operator always knows whether or not the heaters are lit.

You can Save $5.28 Per 39 ft. Panel of Track!



Conventional Anchor

Comparable costs of boxing 8 ties with conventional anchors, and with NO-CREEP anchors.

In each case, 8 ties per 39 ft. panel are anchored TWO ways.

Using Conventional Anchor

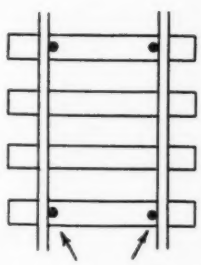
32 anchors, estimated cost	$9.60

Using NO-CREEP Anchor

16 anchors, cost	4.00
Plus welding (if we do welding) 2c per anchor	.32
Total cost	4.32
Savings on anchorage cost	$5.28

Plus . . . additional savings through elimination of maintenance.

Figure these savings against your track program for 1950. Also bear in mind that when using the NO-CREEP Anchors you eliminate the annual cost of resetting or adjusting anchors.



Our 1-piece 2-way Compression Anchor

Use The NO-CREEP RAIL ANCHOR!

Write for Details

G & H RAIL CONTROLS, INC.

Phone BE 8117 **5204 Truman Road** **Kansas City 1, Mo.**

Eastern Representative, Henry A. Hillman Organization
73 East State Street, Westport, Connecticut

THE MONTH'S NEWS

Happenings among the railways—the associations—the suppliers

Changes in Railway Personnel

General

Ralph Budd, president of the Burlington Lines, and an engineer by training and experience, whose retirement was noted in the September issue, was born on August 20, 1879, at Waterloo, Iowa, and received his higher education at Highland Park College, Des Moines,

Ralph Budd

Iowa, graduating in 1899 with the degree of B.S. in civil engineering. His first railway service was with the Chicago Great Western, where he started in the engineering department in 1899, later becoming assistant engineer. In 1902 Mr. Budd went with the Chicago, Rock Island & Pacific, where he served as roadmaster, general superintendent of construction and division engineer. In 1906 he was appointed chief engineer of the Panama Railroad, with headquarters at Colon, Panama. Returning to the States in 1909, Mr. Budd became chief engineer of the Oregon Trunk, the Spokane, Portland & Seattle and the Spokane & Inland Empire. Four years later he went with the Great Northern as chief engineer and assistant to the president, and in 1918 he became executive vice-president of that road. From 1919 to 1932 he served as president and a director of the Great Northern, and in the latter year he became president and director of the Burlington Lines. Mr. Budd is a past director and an honorary member of the American Railway Engineering Association.

B. E. Glenn, roadmaster on the International-Great Northern (part of the Missouri Pacific Lines) has been promoted to trainmaster, with headquarters as before, at San Antonio, Tex.

G. A. Kellow, assistant engineer of the Chicago, Milwaukee, St. Paul & Pacific, at Chicago, has been promoted to assistant to general manager, with the same headquarters, effective September 1.

O. K. Lawson, superintendent of terminals on the Chesapeake & Ohio at Walbridge, Ohio, has been promoted to superintendent of the Hocking division at Columbus, Ohio, succeeding **Ralph N. Begien, Jr.,** who has been advanced to assistant general superintendent of the Western general division at Huntington, W. Va. Mr. Begien replaces **Robert G. Vawter,** who has been promoted to general superintendent of the Eastern general division at Clifton Forge, Va. These men are all engineers by training and early railroad experience.

Percy O. Ferris, chief engineer of the Delaware & Hudson, whose appointment also as assistant general manager was announced in September issue, was born at Peekskill, N.Y., on May 29, 1892. A graduate of Rensselaer Polytechnic Institute (C.E., 1916), he was an instructor in mathematics and surveying there from June, 1916, to July, 1917, when he entered railroad service as rodman in the office of the chief engineer of the D. & H. at Albany. One month later Mr. Ferris became senior transitman at Plattsburg, N.Y., and in November, 1920, he was appointed assistant roadmaster at Port Henry, N.Y. He became track supervisor at Carbondale, Pa., in November, 1921; roadmaster there in September 1924; assistant engineer maintenance of way at Albany, N.Y., in May, 1925; division engineer at Oneonta, N.Y., in April, 1938; and acting engineer maintenance of way at Albany in July, 1938. Mr. Ferris was appointed engineer maintenance of way at Albany in February, 1939, and five months later he was promoted to chief engineer at Albany, which position he will continue to hold in addition to the duties of assistant general manager.

Harry C. Murphy, vice-president of the Burlington Lines, with headquarters at Chicago, and an engineer by training and experience, has been elected president of these lines, succeeding **Ralph Budd,** who retired on August 31, as announced in the September issue. Mr. Murphy was born at Canton, Ill., in 1892. He attended Iowa State College from 1912 to 1915, and the Armour Institute of Technology at Chicago in 1916, studying civil and mechanical engineering. While attending school he worked nights and during vacations for the Iowa Central (now Minneapolis & St. Louis) as a section laborer, station helper and agent. During his summer

Harry C. Murphy

vacation in 1914 Mr. Murphy entered the service of the Chicago, Burlington & Quincy as a clerk in the accounting department. He was transferred to the engineering department as a rodman, and subsequently was advanced to draftsman, transitman, engineer of construction, assistant engineer and division engineer. After serving in World War I as an Army air service pilot, Mr. Murphy returned to the C. B. & Q. in 1919 as division engineer at Centralia, Ill. In the capacity of engineer maintenance of way, or assistant superintendent, he served at Kansas City, Mo., Alliance, Neb., Galesburg, Ill., and Lincoln, Neb., respectively. He served as division superintendent at Centerville, Iowa, Alliance, Neb., LaCrosse, Wis., and McCook, Neb. In 1935 he was appointed superintendent of safety, with headquarters at Chicago, and in 1936 he was promoted to assistant to the executive vice-president (operation). On August 1, 1945, Mr. Murphy became vice-president (operation).

(*Please turn to page 998*)

Fall Spraying with "HERBICIDOL" Shows Remarkable Results...

Here and there among the railroads that we serve each year with chemical weed killer, we find one that has made a very careful study of the subject. One of the interesting discoveries in these observations has been the benefits that accrue when weeds are sprayed late in the growing season.
One astute engineer in this group says—

"We figure that we have the answer to control of weeds.

"The first year that we used 'HERBICIDOL' we discovered how different this product is from the usual water mix weed killer. We observed that the oils in your product remain in an insoluble form in the ballast in a sort of moist condition to continue the work of discouraging new growth long after the water mix weed killers have been washed completely away with rainfall.

"We now make our usual spring spraying. We then make a second lighter treatment in late summer or early fall. This it would seem destroys any seeds that may be in the ballast.

"We are sold on 'HERBICIDOL' and also on two applications per year. This brings benefits that more than compensate for the higher cost as compared to the usual one spraying.

"As related to grass and weeds, our roadbed has never been so clean as it now is and our cost per mile per year is largely offset by reduced track labor costs."

REPORTS LIKE THIS ONE ARE THE BEST PROOF WE CAN OFFER OF THE BENEFITS OBTAINABLE IN THE SERVICE THAT WE PROVIDE.

READE MANUFACTURING COMPANY, INC.

Executive Headquarters
135 Hoboken Avenue
Jersey City, N. J.

Service Headquarters
9500 Cottage Grove Avenue
Chicago, Illinois

PLANTS IN NUMEROUS RAILROAD CENTERS

Railway Personnel (Cont'd)

Orlando H. Frick, general manager of the Chicago Union Station, and who has held engineering positions on various roads, retired on October 1.

J. R. Murray, trainmaster-roadmaster on the Denver & Rio Grande Western, with headquarters at Gunnison, Colo., has been appointed trainmaster of the Salt Lake division at Ogden, Utah.

Ernest L. Potarf, division superintendent of the Chicago, Burlington & Quincy at McCook, Neb., and formerly district engineer maintenance of way on this road, has been advanced to assistant to vice-president—operations, with headquarters at Chicago.

Gideon Jeffery Willingham, manager of personnel of the Illinois Central, and formerly a supervisor of track on this road, has been promoted to director of personnel, with headquarters as before at Chicago.

George D. Hughey, whose appointment as general manager in charge of operations, maintenance, construction and purchases and stores on the Delaware & Hudson, was noted in the September issue, was born at Oakmont, Pa., on December 7, 1884, and received his education at Rensselaer Polytechnic Institute. He was first employed by the engineering department of the city of Pittsburgh, Pa., and later served with the Carnegie Steel Company at Mingo Junction, Ohio. He entered railroad service as a transitman on the Bessemer & Lake Erie on April 17, 1910, remaining with that road until January 1, 1913, when he became an inspector in the maintenance of way department of the D. & H. at Albany. He was advanced to division engineer on August 8, 1917, and to superintendent on May 1, 1925. Mr. Hughey was promoted to superintendent of transportation on October 1, 1928, and became assistant general manager on April 1, 1945, being further advanced to assistant vice-president on June 1, 1948.

Engineering

R. D. E. Farmer, division engineer on the Canadian Pacific at Smith's Falls, Ont., has been promoted to assistant district engineer, with headquarters at Montreal, Que.

H. E. Strate, instrumentman on the Chicago, Rock Island & Pacific at Atlantic, Iowa, has been appointed assistant engineer, with headquarters at Ft. Worth, Tex.

H. L. Vandament, principal assistant engineer on the Chesapeake & Ohio, with headquarters at Richmond, Va., has retired after 38 years of continuous service in the engineering department of this road.

H. B. Christianson, Jr., assistant engineer on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at La Crosse, Wis., has been appointed assistant engineer on the Atchison, Topeka & Santa Fe, at Chicago.

M. H. Aldrich, designer on the New York Central, has been appointed assistant engineer, with headquarters as before at New York.

George L. Sitton, Jr., assistant division engineer on the Southern at Louisville, Ky., has been transferred to Birmingham, Ala.

A. D. Watt, division engineer on the Canadian National, with headquarters at Cochrane, Ont., retired recently after 34 years of service.

T. W. Creighton, whose promotion to district engineer of the Manitoba district of the Canadian Pacific, with headquarters at Winnipeg, Man., was announced in the July issue, was born in Sydney, N.S., on December 9, 1900, and is a graduate of the Royal Military

T. W. Creighton

College, Kingston, Ont. He entered the service of the C.P.R. on July 26, 1921, as a transitman on the Portage division, and subsequently served at various locations in that capacity and as timekeeper, rodman, inspector, junior tracer, resident engineer and relief roadmaster until January 1, 1931, when he became roadmaster at Virden, Man. He served as roadmaster at Brandon, Man., Kenora, Ont., and Keewatin, Ont., until January 15, 1939, when he was advanced to division engineer at Revelstoke, B.C. Mr. Creighton was promoted to assistant district engineer of the British Columbia district, at Vancouver, B.C., on April 1, 1946, and held that position at the time of his recent promotion.

L. V. Lienhard, trainmaster on the Atchison, Topeka & Santa Fe, with headquarters at Newton, Kan., has been appointed division engineer of the Middle division with the same headquarters, succeeding **Henry J. Moore,** whose death is noted elsewhere in these columns.

Lorne J. Hughes, assistant engineer in the office of the chief engineer of the Chicago, Rock Island & Pacific, at Chicago, has been promoted to principal assistant engineer, with the same headquarters, succeeding **James G. Wishart,** who has retired after 45 years of service with this road.

George S. McClure, assistant engineer in charge of roadway for the Pacific Electric, who participated in the construction of many P.E. lines, has retired after 46 years of service with the company. He has been succeeded by **Rudolf Widmann,** who has been given the title of engineer maintenance of way.

A. D. Shackelford, assistant division engineer of the Lakehead division of the Canadian Pacific, at Ft. Williams, Ont., has been promoted to division engineer of the Dauphin division, with headquarters at Dauphin, Man., succeeding **R. C. Robinson,** who has retired. **D. B. McKillop,** assistant engineer at Winnipeg, Man., has been appointed assistant division engineer of the Lakehead division, succeeding Mr. Shackelford.

E. J. Hartsell, division engineer of the Toledo-Ludington division, Pere Marquette district, Chesapeake & Ohio, at Saginaw, Mich., has been appointed office engineer at Detroit, Mich., succeeding to the duties of **V. H. Doyle,** who has been appointed valuation engineer of the system at Richmond, Va., as reported in the September issue. **J. L. Alvord,** assistant division engineer at Saginaw, has replaced Mr. Hartsell.

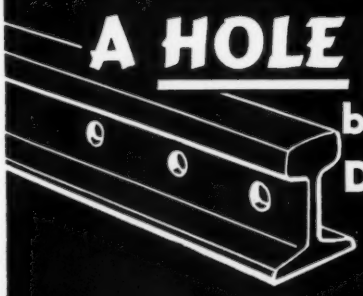
J. H. Reeder, assistant district engineer of the Quebec district of the Canadian Pacific, at Montreal, Que., has been promoted to district engineer at that point, succeeding **J. H. Irvine,** who has retired. Mr. Reeder entered the service of the Canadian Pacific on June 28, 1912, as a transitman at Sudbury, Ont., and was promoted to resident engineer at Schreiber, Ont., in June, 1913, later serving in that capacity at Montreal. In 1924, he was advanced to assistant district engineer of the Quebec district and in 1929, he became general tie agent, transferring in that capacity to the purchasing department in Montreal in January, 1937. He returned to the engineering department on October 1, 1943, as assistant district engineer, the position he held at the time of his recent promotion.

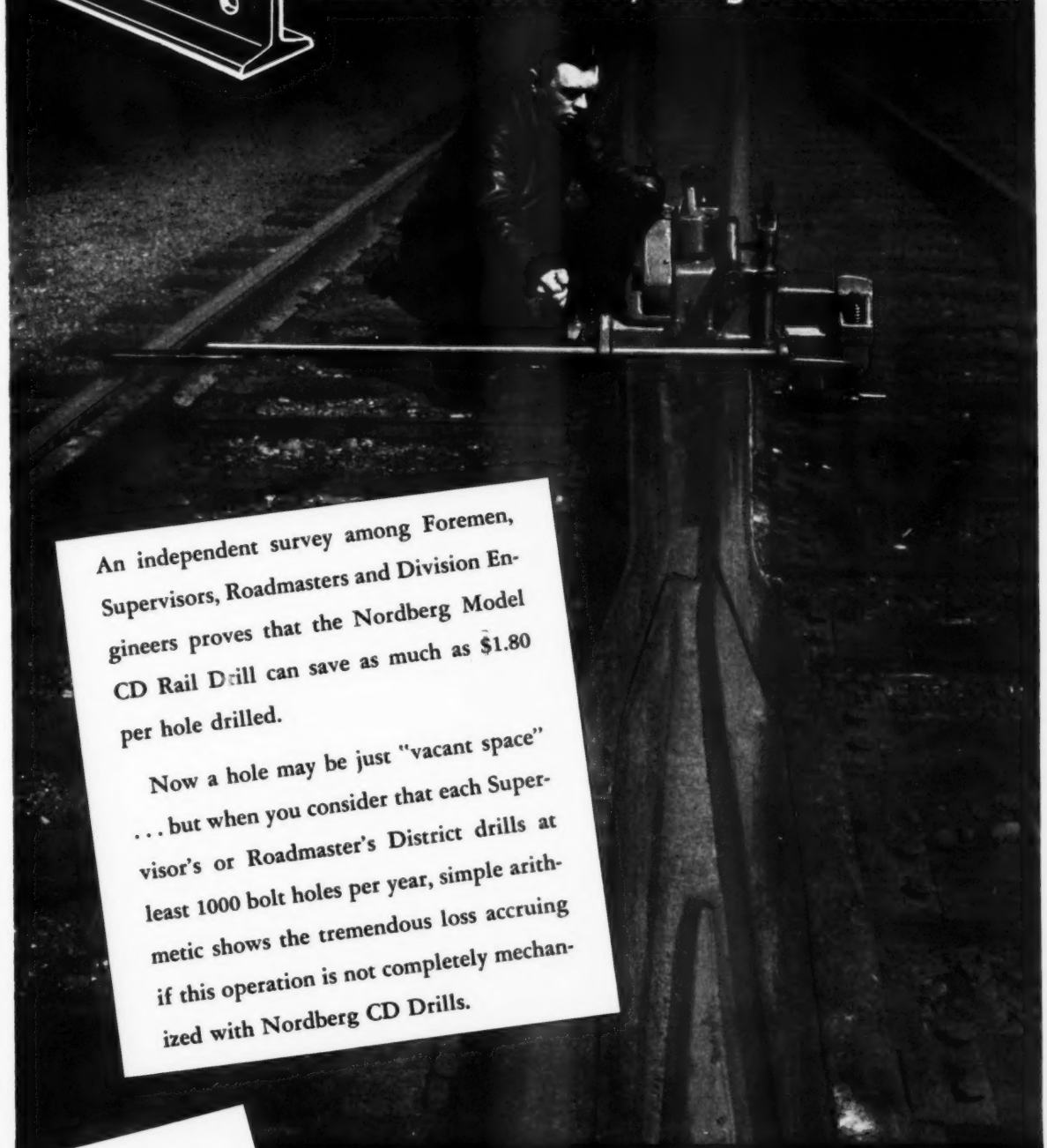
Orville W. Stephens, whose appointment as assistant to chief engineer—maintenance of the Delaware & Hudson at Albany, N.Y., was reported in the September issue, was born on May 29, 1900, at Carbondale, Pa. He attended New York Military Academy, Cornwall, N.Y., and received his civil engineering degree from the University of Michigan, Ann Arbor, Mich., in 1925. Mr. Stephens entered railroad service during school vacations, serving from 1917 to 1925 in various capacities on the Delaware & Hudson. He entered permanent service with the D. & H. in July, 1925, and served until December, 1928, with the engineering corps as draftsman, transitman, and senior transitman. Mr. Stephens was bridge and building supervisor at Carbondale and Green Island, N.Y., from December, 1928, to June, 1938, then becoming track supervisor at Oneonta, N.Y. He was appointed assistant engineer of structures at Albany in May, 1941, which position he held until his recent appointment as assistant to chief engineer—maintenance.

(*Please turn to page* 1000)

A HOLE IS "NOTHING"...

but it costs REAL MONEY to DRILL one in a rail, using hand methods!





An independent survey among Foremen, Supervisors, Roadmasters and Division Engineers proves that the Nordberg Model CD Rail Drill can save as much as $1.80 per hole drilled.

Now a hole may be just "vacant space" . . . but when you consider that each Supervisor's or Roadmaster's District drills at least 1000 bolt holes per year, simple arithmetic shows the tremendous loss accruing if this operation is not completely mechanized with Nordberg CD Drills.

Look to **NORDBERG**

. . . *for continually improved* TRACK MAINTENANCE MACHINERY *to do a Better, Faster Maintenance Job at Lower Cost*

NORDBERG MFG. CO., Milwaukee 7, Wisconsin

These wood preservatives
1. REPEL TERMITES
2. RESIST DECAY
3. RETARD FIRE
and leave wood clean, paintable and safe to handle!

NEW DU PONT COPPERIZED CZC

(CHROMATED ZINC CHLORIDE)

To give wood *extra-long* protection against termites and decay, specify pressure treatment with Du Pont Copperized CZC. In addition, this new salt-type preservative gives timber and lumber all the time-tested advantages of standard CZC treatment. The effectiveness of Du Pont Copperized CZC is shown by these six significant tests: leach block test, hardware corrosion test, accelerated service test, pilot plant treatments, strength tests and glow tests.

STANDARD DU PONT CZC

(CHROMATED ZINC CHLORIDE)

A favorite for many years, Du Pont CZC is a *more economical* preservative treatment to specify when protection against fire is your main objective. It also gives timber and lumber good protection against termites and decay . . . leaves wood clean, easy to paint and safe to handle.

Which of these outstanding wood preservatives to specify depends on your particular needs. Each gives timber and lumber long-lasting, dependable protection. We suggest you consult your nearest wood preserver.

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

MAIL COUPON NOW for complete facts about these two outstanding Du Pont wood preservatives.

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Department R.E.M. 2, Wilmington 98, Delaware

Please send me information on Copperized CZC and standard CZC.

*Name*_____

*Firm*_____ *Street*_____

*City*_____ *State*_____

Railway Personnel (Cont'd)

J. L. Fergus, division engineer on the Nashville, Chattanooga & St. Louis at Chattanooga, Tenn., has been appointed assistant chief engineer at Nashville, Tenn.

Track

H. W. Roberts has been appointed track supervisor on the Atchison, Topeka & Santa Fe, with headquarters at Post, Tex., succeeding **J. M. Greenfield,** whose promotion to roadmaster at Clovis, N. M., was announced in the September issue.

L. G. Allbritton, section foreman on the Southern Pacific, with headquarters at Lozes, La., has been promoted to assistant roadmaster at Lafayette, La. **J. W. Touchton,** junior instrumentman at Lafayette, has also been promoted to assistant roadmaster, with headquarters at Lake Charles, La.

William J. Schramm, track supervisor of Sub-division "H" of the Delaware & Hudson, at Whitehall, N. Y., has been promoted to roadmaster at Schenectady, N.Y., succeeding the late **J. O. Suprenant. B. W. Nyland** has been appointed track supervisor of Sub-division "J" at Whitehall, succeeding **L. H. Rose,** who replaces Mr. Schramm on Sub-division "H" at that point.

A. S. Lang, assistant roadmaster on the Salt Lake division of the Denver & Rio Grande Western, has been transferred to the Alamosa division, with headquarters at Gunnison, Colo., succeeding **J. R. Murray,** whose appointment to trainmaster is noted elsewhere in these columns. Effective July 1.

R. Y. Cook, assistant roadmaster on the Norfolk & Western at Fort Gay, W. Va., has been promoted to roadmaster at Iaeger, W. Va., where he succeeds **W. O. Smith, Jr.,** who has been transferred to Shenandoah, Va., to replace **D. L. Smith,** who retired on August 16. **C. G. Hammond,** inspector in the office of the manager of roadway maintenance, Roanoke, Va., has been promoted to assistant roadmaster, replacing Mr. Cook at Fort Gay.

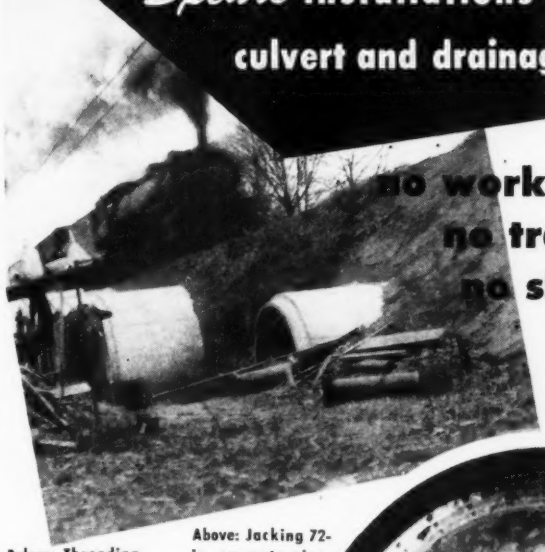
Special

J. S. Giddings, superintendent of the treating plant of the Atchison, Topeka & Santa Fe., at Somerville, Tex., has been advanced to assistant manager of treating plants, system, with headquarters at Topeka, Kan., succeeding **D. L. Murray,** whose promotion to manager of treating plants, system, with headquarters at Topeka, was announced in the September issue. **J. A. Pusinelli,** superintendent of the company's treating plant at Albuquerque, N.M., has been transferred to the treating plant at Somerville as superintendent, to succeed Mr. Giddings. **L. C. Collister** has been appointed superintendent of the treating plant at Albuquerque to replace Mr. Pusinelli.

(*Please turn to page* 1002)

Spears installations solve culvert and drainage problems

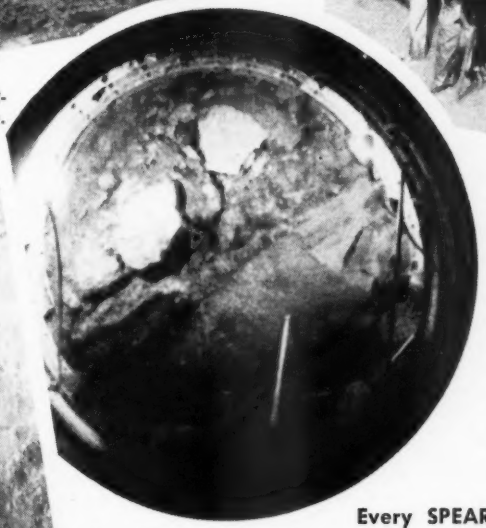
no work trains needed
no traffic delays
no slow orders



Below: Threading 91-in. concrete pipe for cattle underpass.

Above: Jacking 72-in. concrete pipe.

Above: Replacing pile trestle bridge with two lines of 126-in. sectional plate pipe.



Above: Installing 170 ft. of 96-in. liner plate in rock tunnel.

We furnish and install all construction materials (or use your materials) for complete installations of drainage structures—concrete or corrugated metal culverts—small bridges—small tunnels—pedestrian and cattle underpasses.

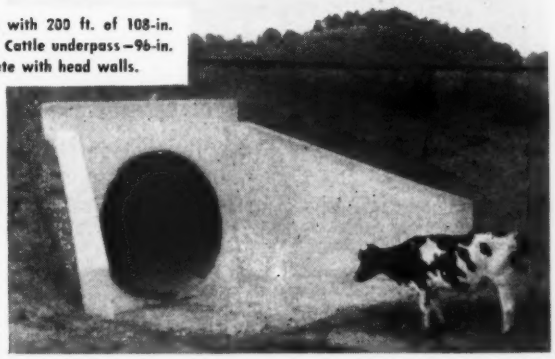
Every SPEARS job is backed by 20 years' experience, and is performed under expert supervision, by skilled workmen using modern equipment.

For personal consultation and investigation of your special problems, without obligation, wire, write, or phone us.

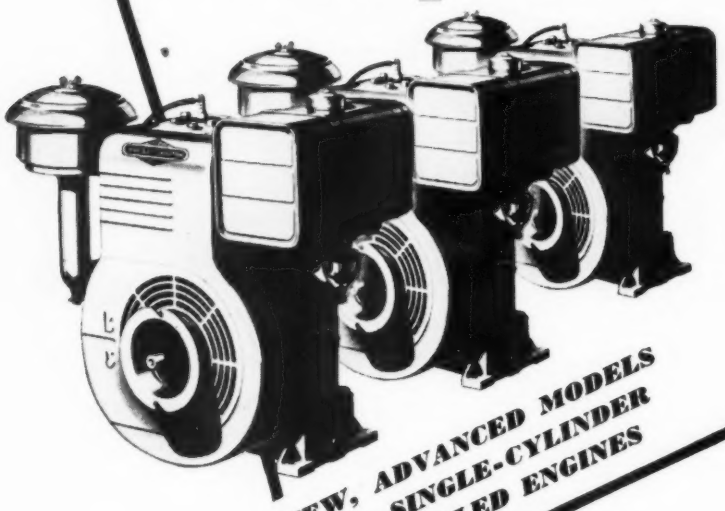
Spears CONSTRUCTION COMPANY

Plaza 2-2710 **1550 East 63th Street, Chicago 37, Ill.**

Left: Replacing old arch with 200 ft. of 108-in. tunnel liner plate. Right: Cattle underpass—96-in. tunnel liner plate complete with head walls.



From Air-Cooled Power Headquarters



. . . 3 NEW, ADVANCED MODELS OF 4-CYCLE, SINGLE-CYLINDER AIR-COOLED ENGINES

Compact — powerful — in brilliant modern design — incorporating many important improvements — these new Briggs & Stratton models are perfected products of the world's largest builders of 4-cycle air-cooled single-cylinder engines, resulting from an experience record spanning more than 30 years and a production record of more than 4 million engines.

These new engines set new standards of value, dependability and performance as "preferred power" for machines, tools and equipment used in industry, and construction, by railroads and on farms.

Complete technical information is available on these new Briggs & Stratton single-cylinder 4-cycle air-cooled gasoline engines:

MODEL "9" 3.1 H.P.
MODEL "14" 5.1 H.P.
MODEL "23" 8.25 H.P.

BRIGGS & STRATTON CORPORATION, MILWAUKEE 1, WIS., U.S.A.

Railway Personnel (Cont'd)

W. L. Gregg, chief tie and timber inspector of the Canadian National, at Moncton, N.B., retired recently after 35 years of service.

Rolland A. Haag, land agent of the Lehigh Valley, has been appointed assistant general land and tax agent with headquarters at New York City, succeeding **William R. Headden,** who has retired after 30 years of service. Mr. Haag started his railroad career as a draftsman in 1914. After graduating from the law school of New York University in 1928, he was admitted to practice law in New York State in 1929. He was promoted to land agent by the Lehigh Valley in 1945.

Bridge and Building

W. R. Cummine, relief roadmaster on the Canadian National at Saskatoon, Sask., has been appointed assistant bridge and building master, with headquarters at Port Arthur, Ont.

Obituary

R. McNeil, retired roadmaster of the Canadian National at Inverness, N.S., died recently. He was 82 years old.

Frank Manning, retired division engineer on the Chesapeake & Ohio, died at Grand Rapids, Mich., on July 6.

Robert C. Patton, Sr., retired track supervisor on the Chesapeake & Ohio, died on June 20 at Hinton, W. Va. He was 76 years old.

M. L. Fox, roadmaster on the Chicago & North Western, with headquarters at Norfolk, Neb., died on June 13.

I. F. Stern, formerly bridge engineer on the Chicago & North Western at Chicago, died in that city on September 10, at the age of 78 years.

Jacob Haas, retired roadmaster on the Atchison, Topeka & Santa Fe., at Woodward, Okla., died on August 21, at the Santa Fe Hospital in Wichita, Kan.

W. L. Coddington, district engineer of the Manitoba district of the Canadian Pacific at Winnipeg, Man., died recently. He had been on leave of absence because of ill health since May.

Henry J. Moore, division engineer on the Atchison, Topeka & Santa Fe, with headquarters at Newton, Kan., died at the Actell Hospital in Newton on July 9, after an illness of six weeks.

William C. Jones, assistant to executive vice-president of the Denver & Rio Grande Western, at Denver, Colo., and formerly chief engineer of the Denver & Salt Lake, died at his home in Denver on September 12, following an illness of several months.

(*Please turn to page* 1004)

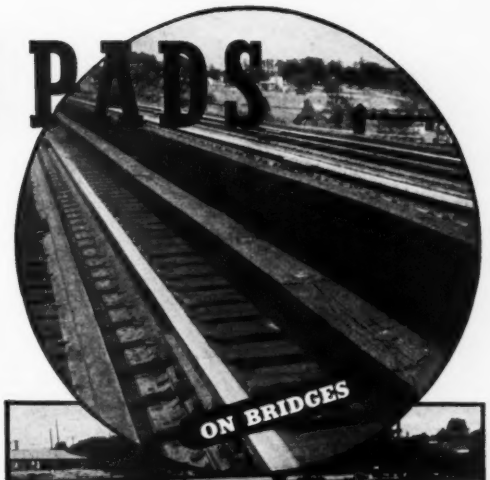
FABCO TIE PADS

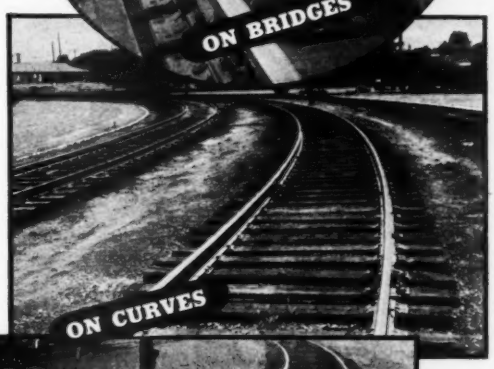
REDUCE MECHANICAL WEAR OF TIES

By reducing the plate cutting of ties Fabco Tie Pads save you money in two ways. (1) They extend tie life. (2) They reduce to a minimum the need for regauging.

17 REASONS WHY YOU SHOULD USE FABCO TIE PADS

1. Prevent cutting of ties by plates.
2. Extend tie life.
3. Reduce labor costs by less frequent tie renewal.
4. Maintain gauge.
5. Save labor of regauging.
6. Have exceptionally long life — comparable to tie life.
7. Withstand extremes of temperature, moisture, brine, sand.
8. Have great strength under load.
9. Do not squash or crush under extremes of temperature or long service.
10. Permanent resiliency assures tight spikes.
11. Resilient winter and summer.
12. Cushion track structure from impacts.
13. Assist in maintaining line and surface.
14. Large tie plates unnecessary.
15. Compensate uneven bearing surfaces.
16. May be transferred from one location to another.
17. Low pad cost.





and STATION APPROACHES

Made by the Makers of Fabreeka with over 15 Years Experience in Track

FABREEKA
PRODUCTS COMPANY
INCORPORATED
222M SUMMER STREET
BOSTON 10, MASS.

NEW YORK
DETROIT
CHICAGO
PHILADELPHIA
SPARTANBURG
OAKLAND

Please send me latest Fabco Tie Pad literature.

NAME.....

FIRM.....

ADDRESS.....

Safeguard

Rolling Stock, Bridges, Tanks, Towers Metal Buildings, Signal Equipment and Other Properties Against COSTLY RUST!

Nothing equals Rust-Oleum —*the proved rust preventive* —for the lasting protection of metal—especially in closed or inaccessible areas where condensation due to temperature changes breeds rust.

RUST-OLEUM

Stops Rust!

- Rust-Oleum cuts preparation time. No sandblasting or chemical cleaners are necessary.
- Rust-Oleum outlasts ordinary materials two to ten times depending on conditions.
- Easy to use — Rust-Oleum assures lasting protection that resists rust-producing conditions.
- Apply by brush, dip or spray . . . in less time. Also available in small container sizes for economical distribution and field use.

Day and night—twenty-four hours a day—rust attacks railroad properties. Stop its deadly ravages by providing Rust-Oleum protection. Rust-Oleum coats metal with a tough, pliable moistureproof film that lasts years longer. *It's the proved answer to many rust problems.*

Rust-Oleum can be applied effectively and economically on all metal surfaces now in service—even where rust has already started. Merely wire-brush to remove scale and loose rust. Rust-Oleum merges the remaining rust into a rust-resisting, durable coating that defies time and the elements.

Save time and labor. Avoid frequent and costly replacements. Protect your properties with Rust-Oleum. Specify Rust-Oleum on new equipment, for re-building jobs . . . and for maintenance.

Get the facts now! Write for catalog containing complete information and recommended applications. Tell us your specific rust problems and we will gladly send you definite suggestions for Rust-Oleum applications.

RUST-OLEUM Corporation

2417 Oakton Street Evanston, Illinois

Association News

Maintenance of Way Club of Chicago

The first fall meeting of the club will be held on October 24, and will feature a discussion of the subject, Economy of Increased Section Lengths—Their Limitation. The meeting will be held, as were the meetings last season, at Eitel's restaurant in the Field Building, Clark and Adams streets, and will begin with dinner at 6:30 p.m.

Bridge and Building Association

The association held its annual meeting in Chicago, September 12-14, concurrent with the annual meeting of the Roadmasters' and Maintenance of Way Association. Joint features of their program with the Roadmasters' are reported on in the Roadmasters' Section of this issue. Detailed reference to the separate features of the B. & B. program, together with committee reports in full, and abstracts of the discussions which followed their presentation, will appear in the November issue.

(*Please turn to page* 1006)

Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 18-20, 1950, Hotel Stevens, Chicago. Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 14-16, 1950, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual meeting April 25-27, 1950, Rice Hotel, Houston, Tex. H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D.C.

Bridge and Building Supply Men's Association—E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting, October 24, 1949. E. C. Patterson, secretary-treasurer, Room 1512, 400 W. Madison street, Chicago 6.

Metropolitan Maintenance of Way Club—Walter L. Turner, Jr., secretary, 30 Church street, New York.

National Railway Appliance Association—R. B. Fisher, secretary; Lewis Thomas, assistant secretary, 59 E. Van Buren street, Chicago 5.

Railway Tie Association—Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

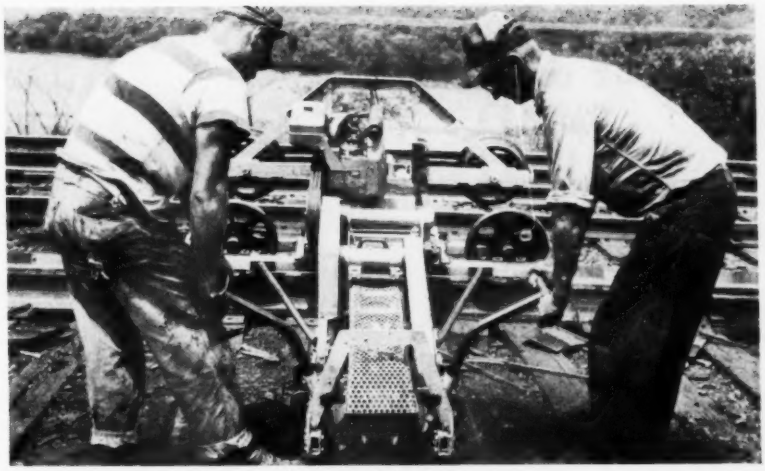
Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 18-20, 1950, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

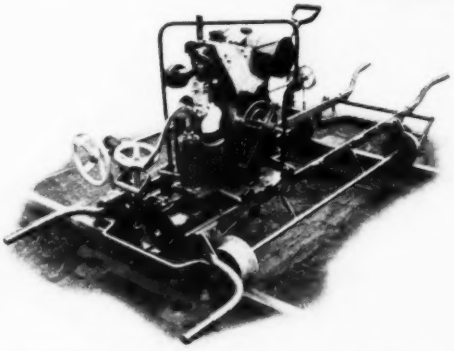
For additional information, use postcard, pages 947-948

7 Track-Proved Ways to S-T-R-E-T-C-H Your Work Week

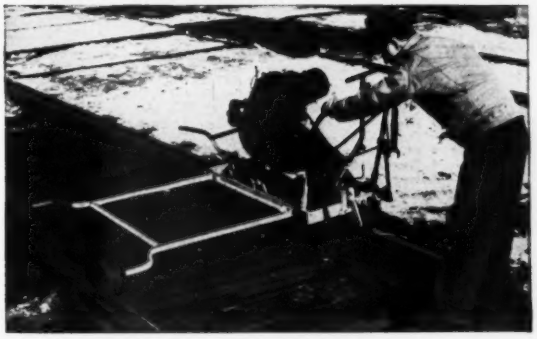
Investigate these
timely cost-saving RTW machines.
Send for literature.



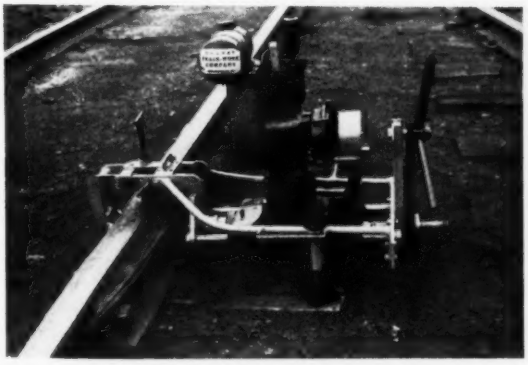
Model P-46 Ballast Extruder



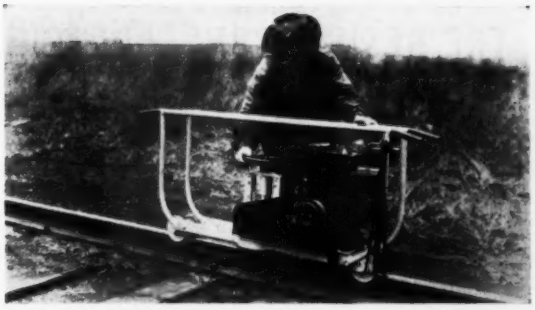
Model P-38 Combination Rail Joint Cross Grinder and Surface Grinder



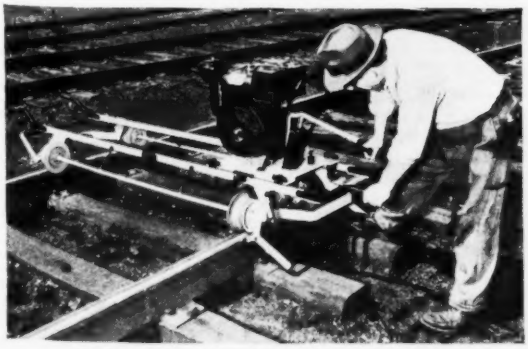
Model P-16-D Portable Stock Grinder



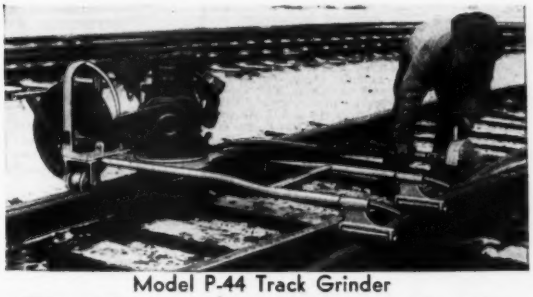
Model P-43 Power Track Drill



Model P-45 Portable Rail Surface Grinder



Model P-11-S Portable Cross Grinder



Model P-44 Track Grinder

Railway Trackwork Co.

3207 KENSINGTON AVE., PHILADELPHIA 34, PA.

AGENTS FOR

THOR Independent Tools • LeRoi Air Compressor • Dapco Paint Sprayer • Chicago Latrobe Drills & Bits • Track Grinding Wheels

6035

LARGE or SMALL . . .

BURRO DOES EVERY JOB EFFICIENTLY, ECONOMICALLY

Whether the Burro is used to speed track laying or relocation, for bridge building, earth or ballast handling or on locomotive coaling jobs, it will handle every job more efficiently and economically—because Burro Cranes are built for railroad work.

Only* BURRO *cranes have:

- *Fast travel speeds—up to 22 M.P.H.*
- *Draw Bar Pull of 7500 lbs. (often eliminates need for work train or locomotive).*
- *Elevated Boom Heels for working over high sided gondolas.*
- *Short tail swing—will not foul adjoining track.*
- *Low overall height—Burro can be loaded and worked on a standard flat car (see illustration).*

Write for Bulletins

CULLEN-FRIESTEDT CO., 1301 S. Kilbourn Ave., Chicago 23, Illinois

CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

Cost-saving practices in

THE DESIGN, CONSTRUCTION and REPAIR of railroad structures

HERE is a well-illustrated guide to current practices in the use of steel-piles for bridge piers . . . pre-cast concrete reinforced bridge slabs . . . rigid-frame and solid-deck bridges . . . and to other economical procedures being followed in designing, constructing, and rehabilitating railroad structures. A practical book for today's engineer, it covers methods of treating railroad track; importance of soil mechanics in foundation design; design and redesign of turntables; grouting and repairing of concrete and masonry structures, etc.

A practical guide to surveying highway and railroad routes

HERE is a practical explanation of modern methods of surveying railroad and highway routes that stresses engineering and economy in route selection. Many state highway departments were consulted regarding their standards and practices, and their specifications together with those of the A.R.E.A. are embodied in this book. It covers reconnaissance, preliminary, final location, and construction surveys . . . locating all types of curves . . . moving of earth and rock . . . legal aspects of right of way—and provides nearly 300 pages of quick reference tables and formulas.

Covers both A.R.E.A. Spiral and Highway Spiral

Just Published

ROUTE SURVEYS

By RUSSELL R. SKELTON

Professor of Civil Engineering, University of New Hampshire

541 pages, 4¼ x 7, 101 illustrations, $4.50

JUST PUBLISHED!

MODERN RAILROAD STRUCTURES

By CHARLES P. DISNEY, Consulting Engineer and ROBERT F. LEGGET, formerly Assoc. Professor of Civil Engineering, Univ. of Toronto

213 pages, 7¼ x 9⅝, $5.00

COVERING all important phases of design and construction, the book contains over 150 illustrations showing modern railroad structures in the United States, Canada, and England. These photographs help spark ideas for the solution of your problems in keeping pace with new methods and materials . . . with better and more economical procedures in modern engineering practice.

SEE THESE BOOKS 10 DAYS FREE

McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep, plus few cents for delivery, and return unwanted book(s) postpaid. (We pay for delivery if you remit with this coupon; same return privilege.)

☐ **Disney and Legget**—Modern Railroad Structures—$5.00
☐ **Skelton**—Route Surveys—$4.50

Name
Address
City Zone State
Company
Position
REM-10-49

This offer applies to U.S. only.

Association News (Cont'd)

American Railway Engineering Association

President F. S. Schwinn spent several busy days in Chicago during the week of September 12. On Monday he addressed the annual meeting of the Signal Section, Association of American Railroads, at the Edgewater Beach hotel. On Tuesday morning he appeared at the Stevens hotel and addressed a joint session of the Roadmasters' Association and the American Railway Bridge & Building Association, his subject on this occasion being the 40-hr. week. In between these addresses and afterwards, Mr. Schwinn made personal appearances before eight standing committees of the A.R.E.A. which had scheduled meetings to be held in Chicago during that week in order that the committee members could attend sessions of the Roadmasters' and Bridge & Building meetings. In his appearance at each of the committee meetings Mr. Schwinn spoke briefly, stressing particularly the responsibility of each member in obtaining new members for the association.

Two committees have scheduled meetings to be held in October. The Committee on Iron and Steel Structures will meet on October 26 and 27 at the Sherman hotel, Chicago, and the Committee on Waterproofing will hold a meeting at Purdue university, Lafayette, Ind., on October 25 and 26 where it will review research work that is being done there on waterproofing materials.

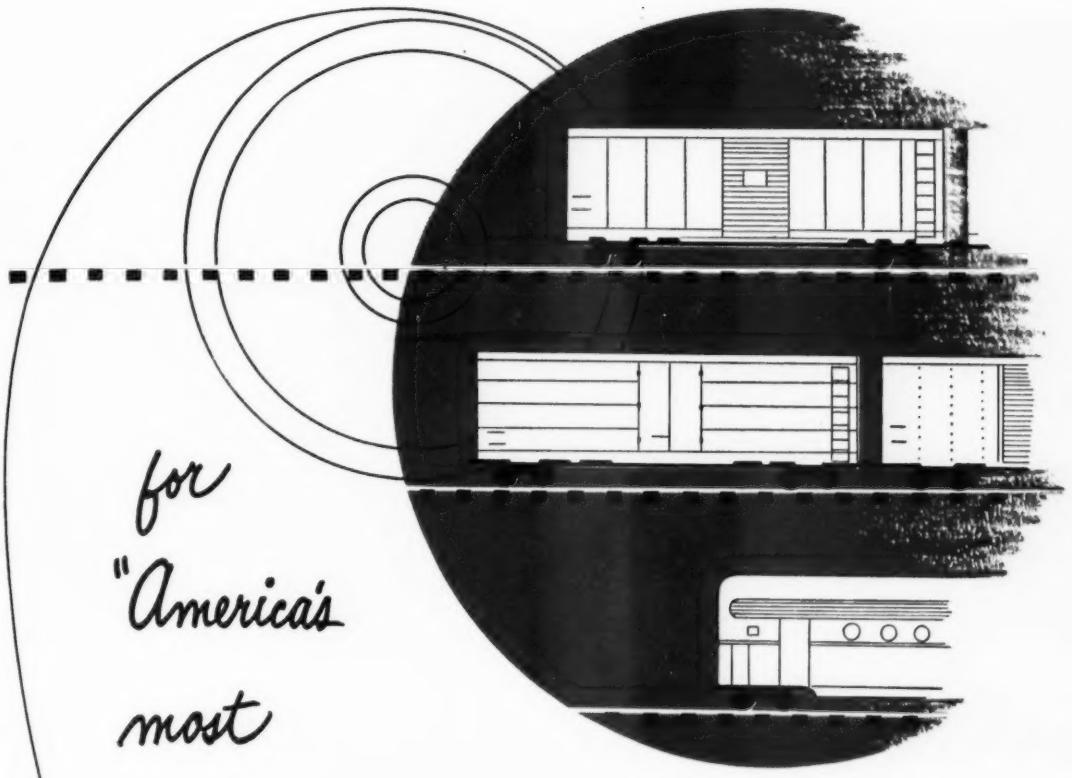
Bulletin No. 482 (September-October) is now in preparation and will be mailed about the middle of October. This bulletin will contain three monographs dealing with current research projects, and will also contain an abstract of the address delivered by Mr. Schwinn before the Roadmasters' and Bridge & Building conventions.

Railway Tie Association

The Association held its thirty-first annual convention at the Hotel Peabody, Memphis, Tenn., September 12-14, and again gave consideration to many of the problems of both producers and users. Approximately 350 registered their attendance, including 80 railroad men.

Features of the three-day program of particular interest to the railroads included addresses by Graham E. Getty, statistician, Association of American Railroads, on The Economic Outlook for the Next Twelve Months in Terms of Crosstie Demands; by Robert N. Hoskins, industrial forester, Seaboard Air Line, on Forestry Practices on One Railroad; by W. J. Hedley, assistant chief engineer, Wabash Railway, on Crosstie Problems of the Engineer; and by B. N. Johnson, Koppers Company, Inc., on The Problem of Peaks and Valleys in Tie Production. Committee reports of special interest to users included those on checking and splitting of crossties, mechanical handling of crossties, timber conservation, and tie specifications. All sessions of the convention were presided over by T. H. Wagner, Gross & James Co., St. Louis, Mo.

(*Continued on page* 1008)



for "America's most popular cars" specify

penta chlorophenol - *treated Cross ties!*

Railroad men, above all others, should appreciate the advantages of PENTAchlorophenol-treated ties. "PENTA"- protected ties can be counted on—they're *dependable.*

The scientific treatment of cross ties with "Penta" means effective protection against termites and decay, longer tie life, and decreased upkeep and replacement costs. "Penta's" deep penetration and low volatility assure protection that lasts through the years, even under the severest climatic conditions.

Specify the "Penta" treatment for safeguarding your cross ties and poles . . . as well as sheds, platforms and other wood construction. For further information about PENTAchlorophenol write Dow, Dept. PE 44A.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW
penta-
chlorophenol

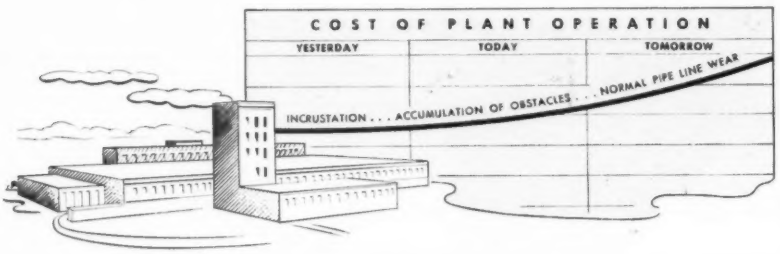
Association News (Cont'd)

In the election of officers, Elmo W. Jones, T. J. Moss Tie Company, St. Louis, was advanced from first vice-president to president; Walter P. Arnold, Wood Preserving Division, Koppers Company, Inc., Pittsburgh, Pa., was advanced from second vice-president to first vice-president; J. R. Keig, Kirby Lumber Company, Beaumont, Tex., was elected second vice-president; and Roy M. Edmonds was re-elected secretary-treasurer.

Mr. Getty said that indications lead to the general conclusion that at best during the next 12 months railway traffic volume will be maintained close to current levels, and came to the conclusion that no marked change from the level of tie replacements in 1948 seems likely—a year which saw the railroads install fewer ties in replacements than in any year on record.

Mr. Hedley admitted important improvements to date in prolonging the service life of ties, but said that still further improvement is possible through improved methods of handling, seasoning and treating ties; continuing improvement in unloading, distribution and application; better selection of timber to cut; and material reduction in splitting and mechanical wear. He called upon tie producers for continued cooperation to the end that this further improvement in service life will be realized.

The report of the Committee on Checking and Splitting of Crossties said that those of the committee who have witnessed end coating experiments are not impressed and feel that the materials and methods that have been employed to date are neither practical nor economical; that there is much difference of opinion as to the value of anti-checking irons, dowels, bands, bolts and other mechanical means to prevent checking and splitting; and that present experiments in the use of tie pads and tie plates fastened securely to the tie, independent of the rail fastening, may lead to some interesting conclusions. Referring to the Vapor-Drying process, the committee said that those of its members who have examined both vapor-dried oak ties and similar air-seasoned ties in service for five years, were much impressed with the superior condition of the vapor-dried ties.



A Simple Solution To Reduce Costs Resulting from "Unseen Pressure and Volume Losses"

Formation of incrustations and tubercles within the pipe cause unseen pressure and volume losses that complicate the work of the water works engineer. These *unseen* losses cannot be overlooked.

NOW is the time to find out whether trouble is ahead in YOUR installation. An economical, general survey of existing conditions in your water supply and disposal systems, made by *The Engineering Division* of the Pittsburgh Pipe Cleaner Company will save you many dollars in the future.

Take advantage of our complete service and maintenance program:

- *General Surveys*
- *Sewer Surveys*
- *Pipe Cleaning*
- *Pipe Coating*
- *Hydraulic Analyses*
- *Industrial Waste Surveys*
- *Installation of new or replacement pipe for your present plant*
- *Design and installation of complete industrial waste disposal plants*

Contact Your Nearest Pittsburgh Pipe Cleaner Company Engineer Today!

PITTSBURGH PIPE CLEANER CO.
133 Dahlem St., Pittsburgh 6, Pa.
BALTIMORE • BIRMINGHAM • BOSTON • BRADENTON, FLORIDA • BUFFALO • CHARLOTTE
CHICAGO • CINCINNATI • DETROIT • HOUSTON • NEW YORK • PHILADELPHIA • ST. LOUIS

Supply Trade News

General

The **Chain Belt Company,** Milwaukee, Wis., has opened a modern warehouse in conjunction with new expanded facilities for its Dallas (Tex.) district sales office at 1611 Dragon street.

E. N. Gosselin, president of the **Graver Tank & Manufacturing Co.,** has announced the establishment of the **Graver Water Conditioning Company** as a division of Graver Tank to extend the operations which have been conducted by the Graver water conditioning and process equipment department.

Personal

Gar Wood Industries, Inc., has established the Chicago Machinery branch, 301 West Thirty-seventh street, Chicago, for the sales and service of its Findlay division product, the model 70 Clipper shovel, in northeastern Illinois and northwestern Indiana. **R. M. Ashley,** formerly assistant to the sales manager of the Findlay division, Findlay, Ohio, has been appointed manager of the Chicago branch.

Azed, Inc., 80 E. Jackson boulevard, Chicago 4, a new corporation jointly owned by **Poor & Co.,** Chicago, and the **Acme Steel Company,** Riverdale, Ill., has been formed to engage in the research, manufacture and sale of products and processes for all phases of the application and secondary treatment of zinc surfaces. **F. A. Poor,** chairman of the board of Poor & Co., is president of the new corporation; **C. S. Traer,** chairman of the board of Acme Steel, **C. J. Sharp,** president of Acme Steel, and **A. E. Chester,** research director of Poor & Co., are vice-presidents of Azed; **P. W. Moore,** president of Poor & Co., is vice-president, secretary and treasurer; and **R. R. Jenkins,** general manager.

(*Please turn to page* 1010)

It's Cheaper to Spot Your Cars with

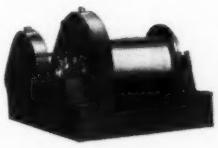
AMERICAN ELECTRIC CAR PULLERS

AMERICAN CAPSTAN TYPE CAR PULLER

Made in two sizes . . . 5,000 and 10,000 lb. starting line pull. Self contained in rigidly constructed welded steel housing. Worm gear, on tapered roller bearings, operates in oil bath.

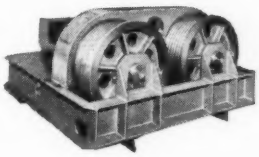
AMERICAN DRUM TYPE CAR PULLER

Made in six sizes . . . from 4,000 lb. to 30,000 lb. starting line pull. Welded steel beds . . . jaw clutches for disengaging drums . . . outside contracting band brakes, foot operated.



AMERICAN CONTINUOUS ROPE CAR PULLER

Individually engineered to fit the job. Quotations and plans gladly furnished on receipt of information concerning the installation.



DO YOU KNOW what it costs you to spot a freight car? Count up the minutes lost while your men are waiting for the switch engine . . . the delays that occur while each car is being spotted. At best, it's a slow, expensive process, requiring the work of several men.

With the AMERICAN Electric Car Puller, *one man* moves cars the instant you want them moved . . . gets the job done quickly . . . and spots cars to loading docks with absolute accuracy. Simple, rugged design in these Car Pullers assures dependable, trouble-proof operation. They are ready for work on a moment's notice, but never cost a penny for "stand-by" time. And in limited space, AMERICAN Electric Car Pullers eliminate completely the slow, dangerous job of moving cars manually with a pinch bar.

The three major types of AMERICAN Car Pullers shown here range in capacity from 4,000 to 30,000 lbs. They cover almost every need in industry. For helpful information on a specific installation, contact your AMERICAN distributor or write us direct. For catalog, mail the coupon below.

American Hoist
and DERRICK COMPANY
St. Paul 1, Minnesota

Plant No. 2: So. Kearny, N. J.
Sales Offices: NEW YORK • CHICAGO • PITTSBURGH

American Hoist & Derrick Co. 9111
63 South Robert Street • St. Paul 1, Minnesota

● Please send catalog on AMERICAN Electric Car Pullers

NAME_____

ADDRESS_____

CITY_____ STATE_____

31

Supply Trade News (Cont'd)

John A. Roebling's Sons Company, Trenton, N. J., has announced that its new Denver, Colo., office and warehouse at 4801 Jackson street will be ready for occupancy on September 30. **Homer H. Davis,** who has represented the company in the Denver area for 23 years, will be manager and **Roy H. Hainsworth,** assistant manager.

The **American Lumber & Treating Co.** has realigned sales responsibilities in two of its district offices. **C. D. Bird,** formerly Middle Atlantic district manager at Washington, D. C., has been appointed district sales manager of the company's newly-organized south central sales region, with headquarters at the Exchange building, Little Rock, Ark. The Washington office has been closed.

J. P. Johnson, Jr., formerly sales representative at Philadelphia, Pa., has been appointed to succeed Mr. Bird as district sales manager of the Middle Atlantic region, with offices to be located at the company's plant in the Fairfield district of Baltimore, Md.

Chain Belt Company, Milwaukee, Wis., has announced the appointment of **John C. Toomey,** as district sales engineer for the Detroit district office.

The **Osgood Company** and the **General Excavator Company,** Marion, Ohio, have announced the appointment of **Earl R. Herb** as district sales manager for North and South Dakota, Minnesota, Wisconsin, Michigan and the northern halves of Indiana and Illinois.

J. J. Collins, assistant general manager of **Iron & Steel Products, Inc.,** Chicago, has been advanced to general manager at that point.

M. A. Hamrick, Chicago district manager for the Wood Preserving division of **Koppers Company, Inc.,** since 1945, has been appointed manager of sales methods at the firm's Pittsburgh (Pa.) divisional headquarters. A native of

M. A. Hamrick

Cedartown, Ga., Mr. Hamrick received a Bachelor of Arts degree from Oglethorpe University. After graduation he spent one year as football coach at Southern Georgia A & M College, and in 1926 he joined the Southern Wood Preserving Company. He first became associated with Koppers' Wood Preserving division in 1928, at the Charleston Wood Preserving plant, and in 1941 he was appointed district manager for the division at Houston, Tex.

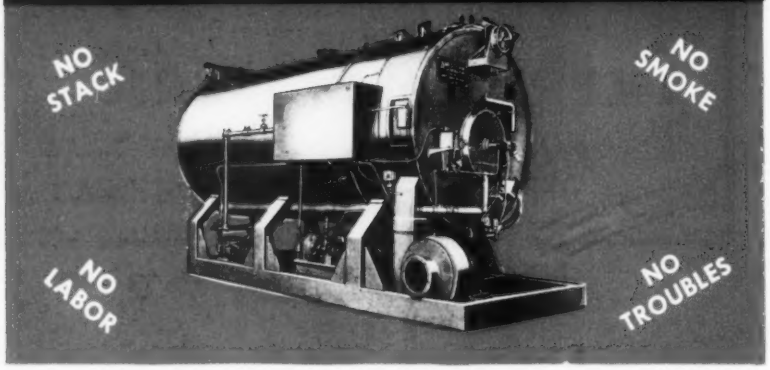
George W. Morrow has become associated with the **Pullman-Standard Car Manufacturing Company** as a member of the sales staff of the Power Ballaster division, with headquarters at Chicago. Mr. Morrow was born at Hackensack, N.J., in 1891. In 1909 he entered the service of the New York, New Haven & Hartford, being appointed track supervisor in 1916. In 1926 he became associated with the Ingersoll-Rand Company and for the next 14 years he handled the sale of tie tampers, compressors and pneumatic tools for this company, with headquarters at Chicago. From 1940 to 1942 Mr. Morrow was in business for himself as a manufacturers' sales agent in the railway field. In the latter year he became manager, railway sales, for the Construction Equipment department of the Worthington Pump & Machinery Corp., with headquarters at Chicago, holding this position until his recent appointment with Pullman-Standard. Mr. Morrow was the first president of the Metropolitan Track Supervisors Club (New York) which was organized in 1921, and was also president of the Roadmasters' and Maintenance of Way Association in 1926.

(*Please turn to page* 1012)

AMESTEAM GENERATOR

"The Railroad Boiler"

PRODUCT OF AMES IRON WORKS, OSWEGO, N. Y.



Over 80%

THERMAL EFFICIENCY

A completely automatic oil or gas fired steam boiler for railroad stations, shops or any special application where steam is required. Product of Ames Iron Works, Oswego, N. Y., with 100 years of experience building boilers.

Single units from 10 to 400 H.P. Suitable for multiple installations. Design pressure—15 to 200 lbs. Higher pressures on order.

Delivered complete ready for service connections—including insulation and jacket. *Phone, write or wire.*

NO BOILER ROOM LABOR REQUIRED

Exclusive Distributors to the Railroads

RAILROAD SUPPLY *and* EQUIPMENT *Inc.*

First Federal Building

148 ADAMS AVE., SCRANTON 3, PA.

Phone Scranton 7-3391

8 A.M. EFFICIENCY

maintained **ALL DAY** with **ORTON**

POWERMATIC

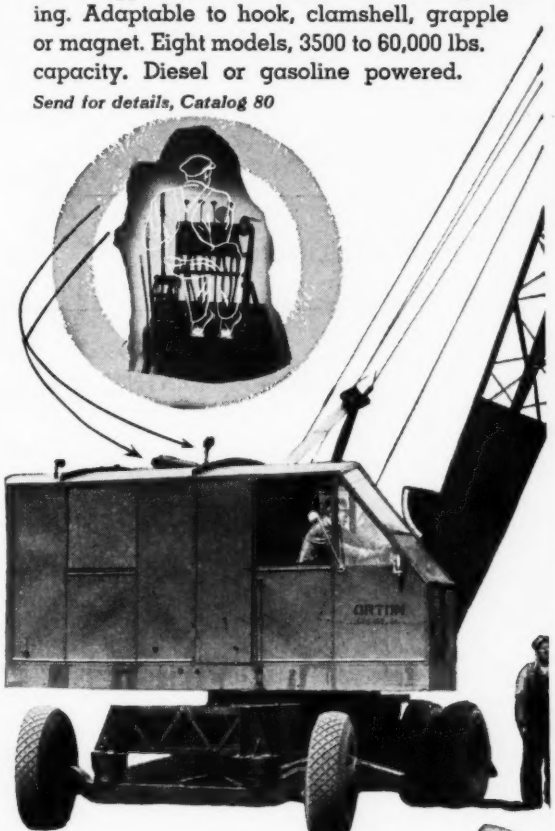
AIR-CONTROL

AERO-CRANE

No afternoon *fatigue let-down!*

One man, with the Powermatic Air-Control Orton Aero-Crane loads and unloads cars and trucks, gets material onto the stockpile and off with *early morning efficiency* all day. High mobility job to job. Full-view cab. Full circle turn-table. Anti-friction bearings. Non-burn Orcoin V-type clutches. Orton SAFETY engineering. Adaptable to hook, clamshell, grapple or magnet. Eight models, 3500 to 60,000 lbs. capacity. Diesel or gasoline powered.

Send for details, Catalog 80



Long-life Orton Aero-Crane has most rigid car body of any crane built. Goes anywhere a truck will go. One man does the work of four handling yard jobs that eat up the time of a crew.

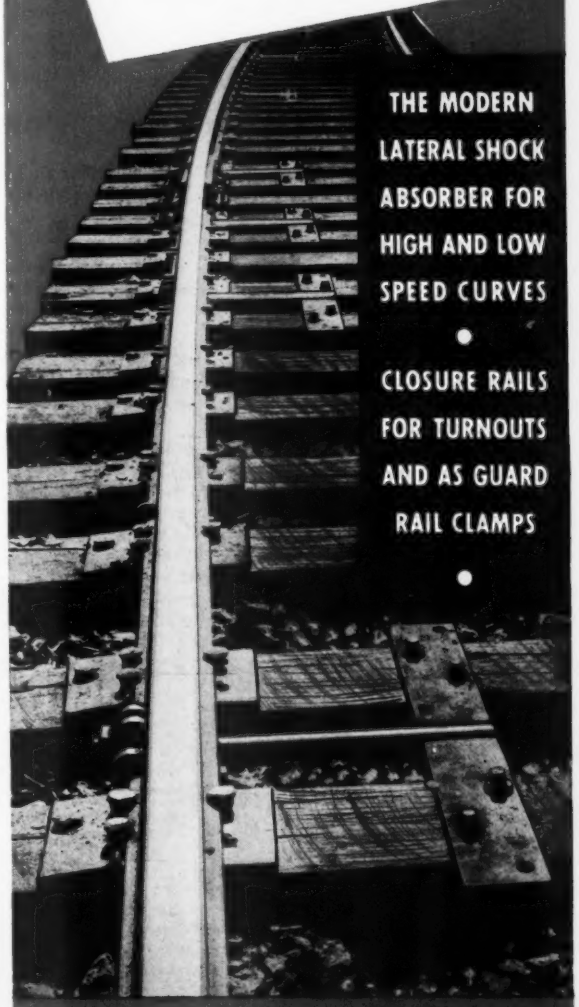
ORTON CRANE AND SHOVEL COMPANY
608 SOUTH DEARBORN STREET
CHICAGO 5, ILLINOIS

● ELIMINATE RE-SPIKING AND RE-GAUGING, SIGNAL FAILURES, SPIKE-KILLING OF TIES **WITH**

MORRISON

Adjustable

RAIL HOLDERS



THE MODERN LATERAL SHOCK ABSORBER FOR HIGH AND LOW SPEED CURVES

●

CLOSURE RAILS FOR TURNOUTS AND AS GUARD RAIL CLAMPS

●

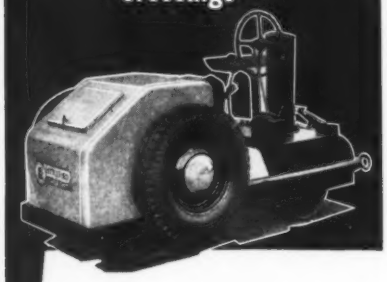
WRITE FOR FOLDER "B"

MORRISON

RAILWAY SUPPLY CORP.

EXECUTIVE OFFICES, SAND ELEV., BUFFALO 2, N. Y.
CHICAGO 4, ILL. BIRMINGHAM 3, ALA.

RAILWAY MAINTENANCE CREWMEN USE
the LITTLEFORD TRAIL-O-ROLLER
for Permanent Crossings



This small, compact, portable Trail-O-Roller makes blacktop crossings, parking areas, station platforms smooth permanent surfaces. The Trail-O-Roller can roll dozens of jobs in a single day—it travels as fast as the maintenance truck can go, yet it takes only 2 minutes to change it from the trailing to rolling position. And too, the compaction is as great as any 5 ton tandem roller.

If you're looking for a time and labor saving unit this Trail-O-Roller will give you the low cost way for doing permanent blacktop maintenance work. Many railroads are using the Trail-O-Roller today to save labor costs—you too can save with a Trail-O-Roller. Write for Bulletin No. 3.

Trail-O-Roller trails behind any maintenance truck.

LITTLEFORD
LITTLEFORD BROS., INC.
471 E. Pearl St., Cincinnati 2, Ohio

Supply Trade News (Cont'd)

Air Reduction Sales Company, New York, has announced the appointment of **Frank J. Aschenbrenner** as assistant director of research and engineering in charge of the company's Murray Hill (N.J.) laboratory. **Earl C. Clark** has also been appointed assistant director of research and engineering, in charge of the development and engineering groups.

W. Henry Caban has been appointed assistant to the president of the **Taylor-Colquitt Company,** Spartanburg, S. C., according to an announcement by A. B. Taylor, president. Mr. Caban will be in charge of engineering. At the same time Mr. Taylor announced the creation of an engineering department to serve the wood preserving industry and the users of this company's Vapor Drying process. Consulting service in these fields will be available to those interested.

Obituary

Dr. Arthur L. Jacoby, associate director of research for the National Aluminate Corporation, died of a heart attack on August 13, at the age of 39.

Philip M. Guba, manager of sales, eastern area, Carnegie-Illinois Steel Corporation, a subsidiary of the United States Steel Corporation, died on August 18, in a New York hospital, following an extended illness.

Trade Publications

(To obtain copies of any of the publications mentioned in this column, use postcards, page 947)

Gunite Concrete—The Gunite Concrete & Construction Co. has published a 28-page booklet on Gunite concrete, presenting its advantages and applications, and illustrating with photographs and drawings a few of the many and various classes of Gunite concrete work completed by this company during its experience as exclusive contractors for this type of construction. The booklet is designated as Bulletin No. 10.

Behind the Scenes with Big Yellow Machines—The Caterpillar Tractor Company has published a 16-page booklet highlighting the precision manufacturing processes behind Caterpillar Diesel crawler and wheel-type tractors, engines and earth-moving equipment. The photographs and text cover research activities, laboratory tests, precision inspection methods, foundry casting, welding, machining and heat treatment.

Fabricating and Finishing of Armco Zincgrip-Paintgrip—The Armco Steel Corporation has issued a 12-page illustrated booklet giving the recommended methods of storing, forming, drawing, welding, soldering, cleaning and painting this special zinc-coated and bonderized sheet metal. It also includes a description of the material and gives the results of various paint-holding tests.

Comfort that pays for itself...

Many times over

The *Improved*
WILLSON LEATHER MASK SAFETY GOGGLES

The mask of high grade, soft, pliable leather fits any face and head size. And it distributes the shock of impact over a wide area. Fitted with WILLSON Super-Tough* lenses, of course, for maximum eye protection.

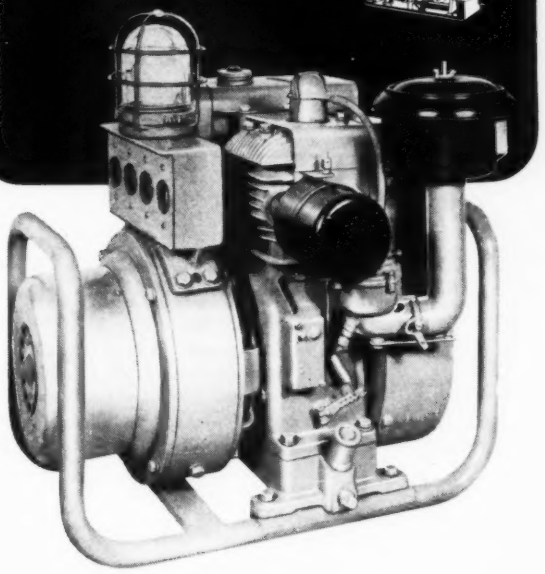
FOR DUSTY JOBS *Style DL48*
Indirectly ventilated with four baffled and screened ports in the eyecups. Exclude dust, grit and other flying particles.

FOR HOT JOBS *Style DL31*
Deep eyecups are well perforated to permit free air circulation to reduce fogging. Particularly adaptable for foundry and steel mill operations.

For more complete information about these and other WILLSON *eye and respiratory protective equipment, get in touch with your Willson distributor or write us direct.*

WILLSON
"Established 1870"
*T.M. Reg. U.S. Pat. Off.
WILLSON PRODUCTS, INC., 243 WASHINGTON STREET, READING, PA.

"U.S." Builds Electric Plants for every railroad need



"U.S." builds a *complete* line . . . . compact Portable units to operate power tools and provide light for emergency maintenance of way . . . . larger units for work trains . . . . dependable units for stand-by service on bridges and signal systems. Gasoline and diesel powered — ½ to 140 kw, A.C. and D.C. Write for detailed specifications.

UNITED STATES MOTORS CORP.

438 NEBRASKA ST.
OSHKOSH, WISCONSIN

Foreign Division:
212 E. Washington Ave.
Madison 3, Wisconsin
U.S.A.

ELECTRIC PLANTS

Keep yards open— trains moving

• Barber-Greene Railroad Snow Loader-Melter

New York . . . Milwaukee . . . Toronto . . . Chicago . . . where will massed drifts jam yards, clog rail centers this winter? Wherever blizzards and heavy snow may strike, railroads whose yards are equipped with the Barber-Greene Snow Loader-Melter can be sure that their yards will be cleaned faster, more effectively and at greatly reduced cost. This team has reduced snow removal costs for some roads as much as $6,000.00 per day over hand methods . . . and saved much more than that in schedules maintained.

This Barber-Greene unit consists of a BG-568 Snow Loader, a Melter Tank, with a capacity of 12,000 gallons, and the Heating Tank of 4,000 gallons capacity. Tanks are heated by direct injection of steam from the locomotive which pushes the unit. For additional information, see your Barber-Greene distributor or write Barber-Greene Company, Aurora, Illinois.

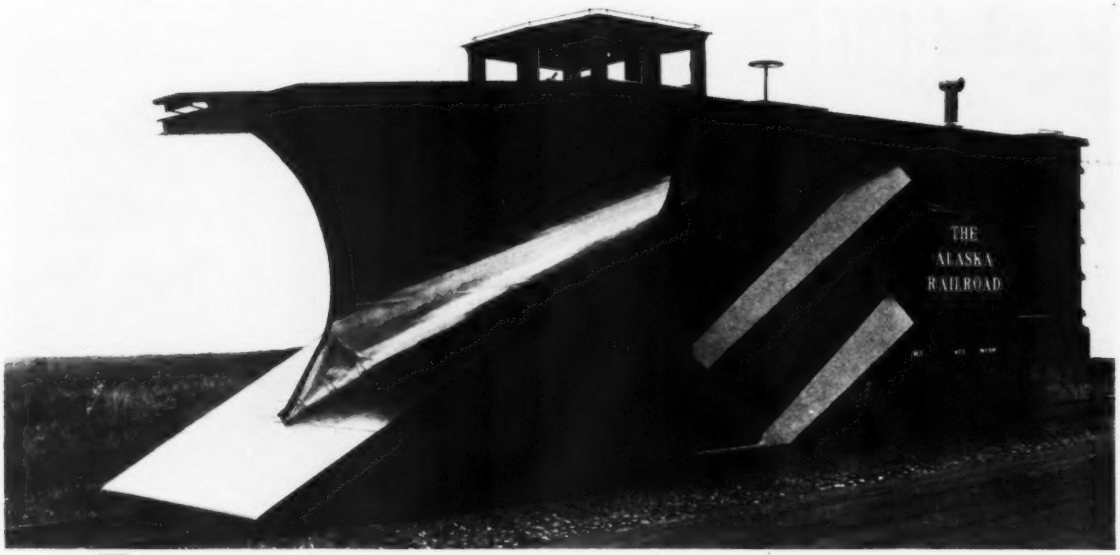
107

SECONDARY COALING STATIONS, *with Barber-Greene specially engineered equipment, provide high capacity loading. Flexible, low-cost, adaptable to almost any track arrangement. Installation is quickly and easily made, operator needs no special training. Capacities from 1½ tons per minute up.*

BARBER-GREENE COMPANY • AURORA, ILLINOIS

Barber-Greene

FASTER - CHEAPER - EFFICIENT



RUSSELL *All Steel Snow Plows*

WITH FLANGERS OR WITH DROP NOSE

Still Time for Some Deliveries this Winter

RUSSELL SNOW PLOW COMPANY, RIDGWAY, PA.

NEW YORK OFFICE—*110 EAST 42ND STREET, NEW YORK, N. Y.*

Do you know all the answers for

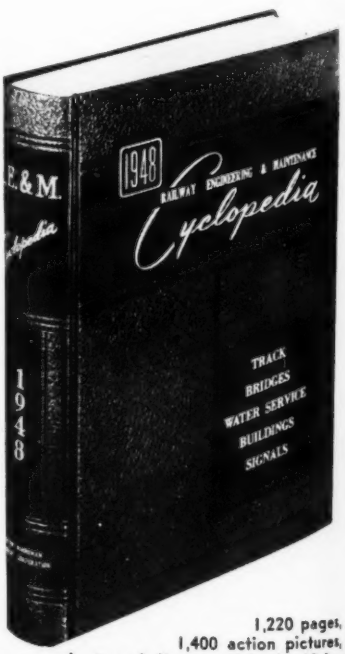
- **THE INTENSIFIED SUPERVISION and**
- **THE GREATER MECHANIZATION**

that are essential with the 40-hr. week?

Unquestionably, the 40-hr. week will result in improved operating methods and the adoption of more labor-saving equipment to handle railroad maintenance in a shorter work week. Never before has there been a greater need for the latest edition of the

RAILWAY ENGINEERING & MAINTENANCE CYCLOPEDIA

This volume is packed with factual information on the latest approved maintenance practices and contains descriptions of hundreds of the most recent mechanical equipment, devices and materials used by the railroads. Every man responsible for the construction and maintenance of Track, Signals, Bridges, Buildings and Water Service should have a copy. It is the only reference book of its kind and was prepared by a staff of experienced railway men for railway men.



1,220 pages, 1,400 action pictures, charts and diagrams 9 in. by 12 in., bound in rich maroon Fabrikoid and stamped in gold.

Simmons-Boardman Publishing Corp. REM 10-49
79 West Monroe St., Chicago 3, Ill.

Send me a copy of the new Railway Engineering & Maintenance Cyclopedia at the price of $8.00 post paid. I enclose check or money order.

Name

Address

City Zone State

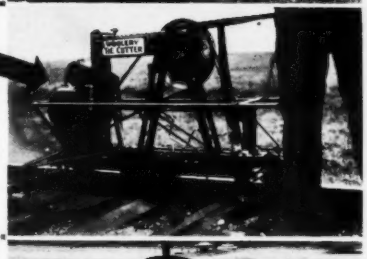
Company

Position

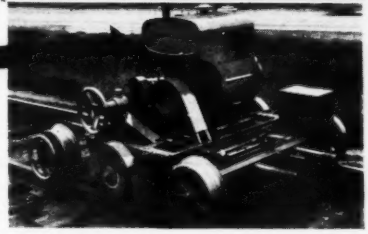
We have sold more copies of the Seventh Edition than any previous one. We have printed additional copies to take care of the increased demand, but the supply is still quite limited. A book of this kind would ordinarily sell at $25.00 per copy. Get yours now by using the attached coupon at the price of only

$8.00 Post Paid

THE Kershaw Co., Inc., Montgomery, Ala., builds this Wisconsin-powered Kershaw Kribber, used in relaying operations.



IN a matter of minutes, the reciprocating blade of this Wisconsin-powered tie cutter slices through ties. Made by Woolery Machine Co., Minneapolis, Minn.



HERE is a Wisconsin-powered combination motor car and frog and rail grinder built by Northwestern Motor Co., Eau Claire, Wis.

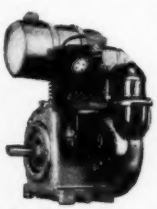
Engines You Can Stake A Reputation On!

WISCONSIN HEAVY-DUTY *Air-Cooled* ENGINES

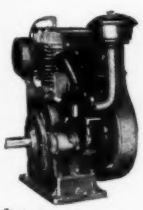
Like the builders of the diversified equipment above, when you specify Wisconsin Heavy-Duty Air-Cooled Engines, *you specify dependability that matches the reputation of the equipment itself!*

- Timken tapered roller bearings both ends of crankshaft . . . take up radial and end thrust loads, or any combination — providing greatest protection against bearing failure.
- Flywheel fan cools at temperatures to 140° F. yet operates perfectly in sub-zero weather.
- Positive jet and spray oil system . . . no grease or oil fittings.
- High tension magneto with impulse coupling . . . for quick cold-weather starts and dependable, continuous operation ignition.

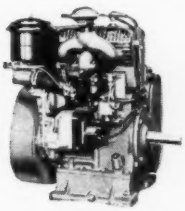
Heavy-duty, precision construction and trouble-free air-cooling assure dependable operation under toughest conditions, and all in all, make Wisconsin Air-Cooled Engines worth looking into the next time you specify power, 2 to 30 hp.



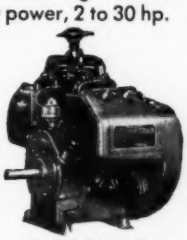
Typical 4-cycle, single-cylinder model, 2 to 5 hp.



Typical single-cylinder model, 4 to 9 hp.



Typical two-cylinder model, 7 to 13 hp.



Typical V-type, four-cylinder model, 15 to 30 hp.

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 14 WISCONSIN

BEALL Hi-Duty SPRING WASHERS are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

We control every step of their manufacture — from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

Their dependability has been proven *made especially* by years of actual service on hundreds of railroads.

BEALL HI-DUTY SPRING WASHERS, being made especially for railroad service are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.

BEALL TOOL DIVISION (HUBBARD & CO.)
140 Shamrock St., EAST ALTON, ILL.
SPECIALIST MANUFACTURERS OF SPRING WASHERS

BEALL Hi-Duty SPRING WASHERS

for Railroad Service

WARWOOD

THE PICK OF THE PICKS

Tamping Pick

No. 2-T

When it comes to track tools, you can depend upon Warwood for design, quality, and longer service. Every Warwood Tool is

WARWOOD WORKMANSHIP MAKES THE DIFFERENCE

accurately forged and scientifically heat treated to meet A.R.E.A. specifications. The job is better done with a Warwood Tool.

Clay Pick

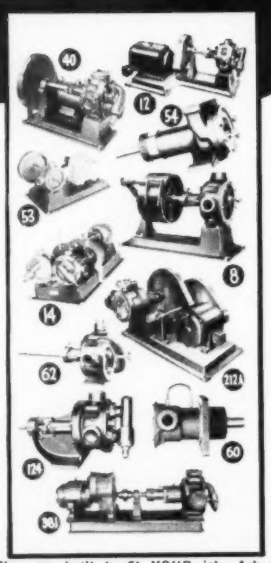
No. 1-T-PC

PICKS - MAULS - WRENCHES - BARS - TONGS
PULLERS - FORKS - ADZES - SLEDGES
HAMMERS - CHISELS - PUNCHES

WARWOOD SINCE 1854 FORGED TOOLS

WARWOOD TOOL COMPANY • *Wheeling, West Virginia*

LOWER YOUR COSTS
By Using The Right
VIKING PUMP
FOR YOUR JOB!



There is no compromise when you pick Vikings for your job. They are built in the most complete range of sizes and styles to give you the pump that will help you cut your pumping costs.

The Viking line assures you of the correct pump. No wasted power . . . no need to accept a pump not quite designed for your work . . . or one a little too small . . . or one a little too large.

VIKING
AN HONORED NAME IN PUMPING

They are built to fit YOUR job. Ask for free folder 49SY today.

See Our Catalog In SWEETS

Viking PUMP COMPANY
Cedar Falls, Iowa

BACK VOLUMES
RAILWAY ENGINEERING AND MAINTENANCE

You can fill out your set of bound volumes of Railway Engineering and Maintenance from extra copies in our Cleveland and New York offices:

Vols. 12-21, 1916-1935, Cleveland.
1930, 1931, 1932, 1933, 1936, 1946, New York.

Excellent bindings. $3.00 each, fob.

We also have broken sets of Railway Age, Railway Mechanical Engineer, and Railway Signaling. A list will be sent on request.

Book Department

Simmons-Boardman Publishing Corp.
30 Church Street **New York 7, N. Y.**

SEALTITE FASTENERS

Double-Life
SEALED-TITE IN ZINC

All Sealtite products are offered in our thick, double-life, hot dipped galvanized finish. As the name implies, the service life of the bolt is lengthened saving replacement costs and assuring freedom from fastener corrosion. Actual experience tests prove the economy of using Double-Life Sealtite Products.

LEWIS BOLT & NUT CO., 504 Malcolm Ave. S.E., Minneapolis

Designed and Engineered
FOR RAILWAY USE

SAVES LABOR SAVES LABOR SAVE
SAVES LABOR SAVES LABOR
SAVES LABOR SAVES LABOR
SAVES LABOR SAVES LABOR
SAVES LABOR SAVES LABOR SAVES LABOR SAV

THE IMPROVED GAUTIER RAIL ANCHOR

The need today for railroads to keep their maintenance-of-way costs to a minimum, highlights the desirability of the Improved Gautier as a labor saving anchor . . .

★ It is quickly and easily applied with a maul or spike maul.
★ It requires very little maintenance once installed.
★ It lasts the life of the rail.

Other outstanding features: Drive on anchor made of alloy steel • Can't be overdriven • Retains its holding power on reapplication • Designed for use on old rail as well as new. *Write for complete information.*

MID-WEST FORGING AND MANUFACTURING CO.
General Offices: 38 So. Dearborn St. • Chicago 3, Ill. • Mfg. Plant • Chicago Heights, Ill.
Eastern representative: Moore and Steele Corp., Owego, Tioga County, N.Y.

YOU'LL DO MORE IN 40 HOURS
with the
Simplex
ALUMINUM ALLOY
A-5

For Faster Track Jacking

Aluminum Alloy Housing for Lightness! **Simplex Engineered for Power!**

The A-5 has a sturdy horn handle, which makes it easier to position the Jack. It is used for surfacing, lining (up to 2"), tie plate renewal, in conjunction with welded rail, and with tamping and ballasting machines. Enlarged toe lift, 2½" x 3¼". Aluminum alloy housing reinforced throughout equals the strength of standard jacks weighing 40% more. Get full details in Bulletin: Track 50.

1899 Jubilee 1949

Simplex
LEVER • SCREW • HYDRAULIC
Jacks

TEMPLETON, KENLY AND COMPANY
1026 South Central Avenue • Chicago 44, Illinois

WHAT'S TO BE GAINED BY MAKING COMPARISONS

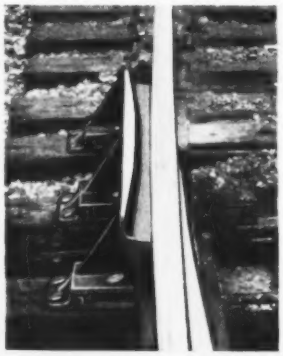
COMPARISONS readily and conclusively prove that Layne well water systems have many superior points not equaled by other systems. They prove that Layne systems have greater producing capacity, higher overall efficiency and a longer service life. Upkeep cost, due to use of high quality materials and workmanship, is surprising low. Installations include Layne Vertical Turbine Pumps which are noted for their outstanding trouble-free and economical service. They are built for hard continuous operation and will meet all performance requirements.

For catalogs or further information, address

LAYNE
LAYNE & BOWLER, INC.
General Offices
MEMPHIS 8, TENNESSEE

WELL WATER SYSTEMS

Q AND C SWITCH POINT GUARDS WILL SAVE RENEWALS OF SWITCH POINTS AND STOCK RAILS



Q and C Manganese Switch Point Guards will help to keep traffic moving in yards and terminals, without delays caused by sharp wheel flanges climbing on worn points.

A full width is maintained on the head of the rail next to the guard, resulting in continued good fit for the point.

Order now to insure these savings for your railroad.

OTHER Q AND C PRODUCTS:

Derails, Guard Rail Clamps, One-Piece Manganese Guard Rails, Step Joints, Wheel Stops, Gauge Rods, Car Replacers, Snow Flangers and Plows, Skid Shoes, Anti-Slip Rail Tongs, Flangeway Brackets, Electric Snow Melters, Gauging Tools, Foot and Heel Guards.

Q AND C — CHICAGO

THE Q AND C CO.

NEW YORK

Serving Railroads Since 1886.

Q AND C — ST. LOUIS

ALPHABETICAL INDEX TO ADVERTISERS, OCTOBER, 1949

A

American Brake Shoe Company 954
American Hoist and Derrick Company 1009
Armco Drainage & Metal Products, Inc. 936
Automatic Nut Company 943

B

Barber-Greene Company 1013
Barco Manufacturing Company 919
Beall Tool Division, Hubbard & Co. 1015
Bethlehem Steel Company 915
Briggs & Stratton Corporation 1002

C

Chicago Pneumatic Tool Company 946
Chipman Chemical Company, Inc. 938
Colorado Fuel and Iron Corporation, The 934
Cullen-Friestedt Co. 1006

D

Dearborn Chemical Company 926
Dow Chemical Company, The 1007
Duff-Norton Manufacturing Co., The 921
du Pont de Nemours & Co., Inc., E. I. 1000

E

Eaton Manufacturing Company 914
Electric Tamper & Equipment Co. 993

F

Fabreeka Products Company, Incorporated 1003
Fairbanks, Morse & Co. 932
Fairmont Railway Motors, Inc. 952
Flintkote Company, The 923

G

G & H Rail Controls, Inc. 995

H

Harnischfeger Corporation 949
Hough Co., The Frank G. 933
Hubbard & Company 1015

I

Industrial Brownhoist Corporation 929
Ingersoll-Rand Company 937

K

Koppers Company, Inc. 941

L

Layne & Bowler, Inc. 1017
Lewis Bolt & Nut Co. 1017
Link-Belt Speeder Corporation 942
Littleford Bros., Inc. 1012
Lufkin Rule Co., The 928

M

Magor Car Corporation 918
Maintenance Equipment Company 945
McGraw-Hill Book Co., Inc. 1006
Mid-West Forging & Manufacturing Co. 1017
Morrison Railway Supply Corp. 1011

N

National Lock Washer Company, The 1019
Nordberg Mfg. Co. 999
Northwest Engineering Co. 917

O

Oliver Corporation, The 922
Orton Crane and Shovel Company 1011
Oxweld Railroad Service Company, The 935

P

P. & M. Co., The 913
Pittsburgh Pipe Cleaner Co. 1008
Power Ballaster Division 930-931
Pullman-Standard Car Manufacturing Company 930-931

Q

Q and C Co., The 1018

R

Racine Tool and Machine Co. 916
Rail Joint Company, The 924
Railroad Accessories Corporation 951
Railroad Supply and Equipment Inc. 1010
Rails Company, The 944-1020
Railway Track-work Co. 1005
Ramapo Ajax Division 954
Reade Manufacturing Company, Inc. 997
Ric-wil Company, The 925
Russell Snow Plow Company 1014
Rust-Oleum Corporation 1004

S

Schramm Inc. 940
Simmons-Boardman Publishing Corporation 1014-1016
Spears Construction Company 1001
Sperry Products, Inc. 927
Sperry Rail Service 927

T

Templeton, Kenly and Company 1017
Timken Roller Bearing Company, The 939

U

Union Carbide and Carbon Corporation 935
United States Motors Corp. 1013

V

Viking Pump Company 1016

W

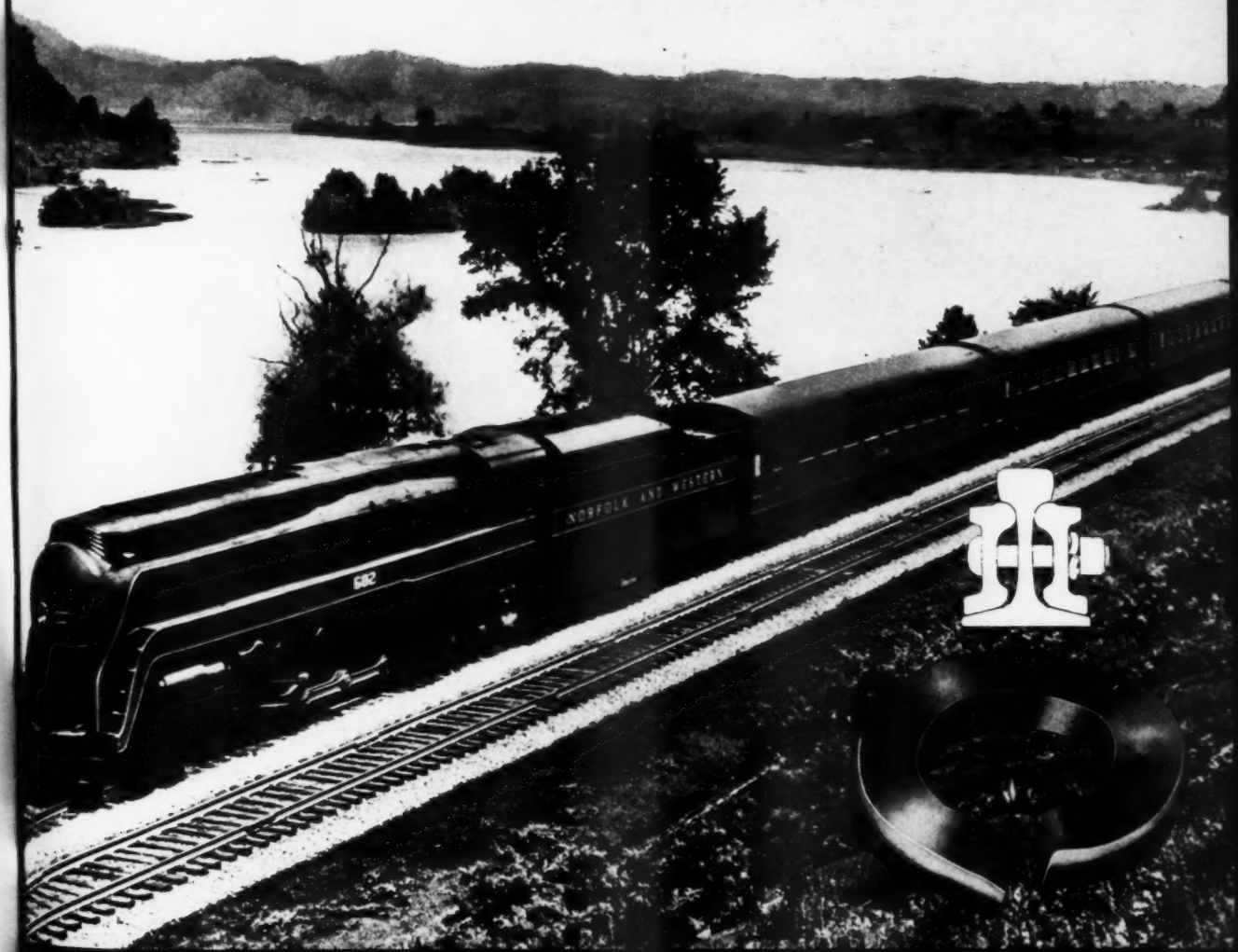
Warwood Tool Company 1016
Willson Products, Inc. 1012
Wisconsin Motor Corporation 1015
Woodings Verona Tool Works 991
Woodery Machine Company 920

On thousands of miles of track, in all parts of the country, under every conceivable condition of weather and wear Improved Hipowers play an invaluable though inconspicuous role.

They serve continuously—absorbing shocks and stresses, equalizing bolt tensions, insuring resilient joints, and protecting rail ends.

IMPROVED HIPOWERS

IMPROVE TRACK



THE NATIONAL LOCK WASHER COMPANY, NEWARK 5, N. J., U. S. A.

A COMPLETE LINE OF RAILWAY SPRING WASHERS

THE RAILS COMPANY

General Office

178 GOFFE STREET, NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO